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Running Head: SELF-ESTEEM AND DEPRESSIVITY ACROSS GENERATIONS

**Testing the Vulnerability and Scar Models of Self-Esteem and Depressive Symptoms
from Adolescence to Middle Adulthood and Across Generations**

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Abstract

The vulnerability model states that low self-esteem functions as a predictor for the development of depressive symptoms whereas the scar model assumes that these symptoms leave scars in individuals resulting in lower self-esteem. Both models have received empirical support, however, they have only been tested within individuals and not across generations (i.e., between family members). We thus tested the scope of these competing models by (a) investigating whether the effects hold from adolescence to middle adulthood (long-term vulnerability and scar effects), (b) whether the effects hold across generations (intergenerational vulnerability and scar effects) and (c) whether intergenerational effects are mediated by parental self-esteem and depressive symptoms and parent-child discord. We used longitudinal data from adolescence to middle adulthood ($N = 1,359$) and from Generation 1 adolescents (G1) to Generation 2 adolescents (G2) ($N = 572$ parent-child pairs). Results from latent cross-lagged regression analyses demonstrated that both adolescent self-esteem and depressive symptoms were prospectively related to adult self-esteem and depressive symptoms three decades later. That is, both the vulnerability and scar models are valid over decades with stronger effects for the vulnerability model. Across generations, we found a substantial direct transmission effect from G1 to G2 *adolescent* depressive symptoms but no evidence for the proposed intergenerational vulnerability and scar effect nor for any of the proposed mediating mechanisms.

Keywords: self-esteem, depressive symptoms, life span development, intergenerational transmission, adolescence

Introduction

In the present study we tested the long-term longitudinal and intergenerational validity of the vulnerability and the scar models. Whereas the vulnerability model states that self-esteem is a relatively stable personality factor serving as a predictor of depressive symptoms (Beck, 1967, 1987; Orth & Robins, 2013), the scar model (Shahar & Davidson, 2003) states the opposite assuming that depressive episodes wound individuals (see Zeigler-Hill, 2011, for an overview of both models). According to the scar model, the depressive symptoms wear away one's self-esteem due to permanent scars originally caused by the depression. A number of longitudinal studies have extensively studied these competing models revealing strong support for the vulnerability model and weaker support for the scar model, as the former typically shows twice as large effect sizes compared to the latter (Orth & Robins, 2013; Sowislo & Orth, 2013).

Depressive symptoms are typically associated with serious consequences such as helpless behavior in social and achievement situations or physical disability (Bruce, Seeman, Merrill, & Blazer, 1994; Nolen-Hoeksema, Girgus, & Seligman, 1992) that can persist for years (Coryell, Scheftner, Keller, Endicott, Maser, & Klerman, 1993). Low self-esteem, on the other hand, is a valid predictor of a number of maladaptive life outcomes such as delinquency or lowered economic prospects (Donnellan, Trzesniewski, Robins, Moffitt, & Caspi, 2005; Trzesniewski et al., 2006). Given the strong relation between low self-esteem and depressive symptoms and their negative effects on several important life outcomes, it is not surprising that they are extensively studied, particularly in the field of personality and clinical psychology (McCann & Sato, 2000), and that enhancing self-esteem and/or lowering depressive symptoms are central aims to many psychologists (Gortner, Rude, & Pennebaker, 2006; O'Mara, Marsh, Craven, & Debus, 2006; Robins, Trzesniewski, & Donnellan, 2012).

Despite considerable interest in this research domain, open questions remain. If low self-esteem and depressive symptoms are such clear predictors for the development of depressive symptoms or low feelings of self-worth, the question then arises (a) about their long-term validity across different developmental periods (i.e., from adolescence to middle adulthood), (b) whether they also reveal prospective power for related individuals (i.e., intergenerational effects) and (c) what factors might explain potential intergenerational effects. It is possible that the vulnerability and scar models can be applied more broadly, that is, the effects of low self-esteem and/or depressive symptoms might be carried *along across the lifespan* over decades and might even *spill over to the next generation*.

How Long Do the Vulnerability and Scar Effects Remain Powerful?

Several explanations would suggest *long-term* vulnerability and scar effects. For example, life span development theorists suggest that human development is an open system that is both influenced by individuals as agents and co-constructed by environmental, cultural and genetic conditions (Baltes, Staudinger, & Lindenberger, 2006; Pomerantz & Thompson, 2008). That is, individuals are born into a certain environment and culture with a set of genes but while the culture, the genes and the social circumstances certainly shape an individual's self, it is also the individual who increasingly shapes the world around him or her while growing-up. Hence, situational factors, behavior and personality characteristics exhibit a mutually explanatory pattern placing the individual "on a life path that often becomes self-reinforcing" (Kern, Porta, & Friedman, 2013, p. 3). In line with this assumption, people typically show relatively stable behavioural patterns and characteristics over time resulting in more or less healthy lifestyles (Friedman, 2000; Kern et al., 2013). Low self-esteem individuals often show negative information processing patterns such as ruminating about own failures and losses (Kuster, Orth, & Meier, 2012) and a persistent sensitivity to rejection from relevant others (Joiner, Alfano, & Metalsky, 1992) making them vulnerable to the

development of depressive symptoms. If such patterns are acquired during adolescence they might remain influential beyond the adolescent years. Likewise, the scar effect might remain powerful across the lifespan because the experienced depressive symptoms might have weakened relevant social relationship (Orth, Robins, & Roberts, 2008) or altered one's self-view resulting in sensitivity for negative as opposed to positive information about the self (Rohde, Lewinsohn, & Seeley, 1990). In summary, the vulnerability and scar effects may remain influential from adolescence to adulthood due to changes in information processing and/or behavioural patterns that mutually reinforce each other across the lifespan.

Do the Vulnerability and Scar Effects Remain Powerful Across Generations?

Several explanations exist for potential *intergenerational* vulnerability and scar effects. For example, from a sociocultural perspective, certain conditions in one generation are relevant for subsequent generations (Bengtson & Allen, 1993; Elder, 1994). According to the life course theory, each individual of a family is a member of a "shared history" (Bengtson & Allen, 1993). Family members might learn to interpret social, environmental, historical, or family related events in a similar way, as they share the same background and common knowledge.. For example, a mother who learned to respond to criticism fearfully and self-consciously might transmit that pattern of interpretation to her child. As a consequence, both members of this family might possess low self-esteem and thus might be more likely to develop depressive symptoms due to their unfavorable information-processing pattern (Abramson, Metalsky, & Alloy, 1989; Beck, 1987). Likewise, Thompson and Zuroff's (1998) showed that mothers high in self-criticism engage in more negative feedback with their children compared to mothers low in self-criticism. Similarly, self-critical styles of depressed parents seem to be transmitted to children by means of the speech style caregivers exhibit (Murray, Kempton, Woolgar, & Hooper, 1993).

Furthermore, from a learning perspective, children observe situations their parents encounter and the parental reactions typically applied to these situations. Both the parental behavioural model (Bandura, 1977), the home environment and the genetic disposition in parent and child (Pomerantz & Thompson, 2008) might lead to personality or behavioural similarities across generations. G2 adolescents might have observed and adopted inferential styles and negative patterns of attending to and interpreting situations from their parents, making them more vulnerable to the development of depressive symptoms (Abramson et al., 1989; Alloy, Lipman, & Abramson, 1992; Gibb et al., 2009; Pomerantz & Thompson, 2008). If parents become anxious and self-conscious in the face of a difficult situation they may convey to their offspring that abandoning such a situation is an adaptive way of coping, whereas parents showing positive affect might transmit to their children that the situation – although challenging – can be resolved (Thompson & Meyer, 2007).

Potential Mediating Mechanisms: Adult Depressive Symptoms, Adult Self-Esteem and Parent-Child Discord

Taken together, it is likely that G1 adolescents suffering from low self-esteem at a key developmental stage for identity development remain sensitive to the rejection from important others (Joiner, Alfano, & Metalsky, 1992) even when they become adults. As they move through different developmental stages, their self-esteem might be threatened at a certain point in time, resulting in depressive symptoms, which in turn, might impede the second generation's positive identity development during their vulnerable adolescent years. Thus, the hypothesized vulnerability effect across generations might be mediated by the adult's level of depressive symptoms. This assumption is in line with longitudinal research showing that offspring of vulnerable mothers have a fourfold higher rate of displaying psychological disorders compared to offspring of non-vulnerable mothers (Bifulco et al., 2002).

As for the hypothesized scar effect across generations, the scars that originate from depressive symptoms in adolescence may remain consequential for the next generation insofar as these parents might exhibit more insecurity, less confidence and more negative affectivity in their every-day interaction with their children compared to parents who never made such adverse experiences (Goodman, Adamson, Riniti, & Cole, 1994; Whitbeck et al., 1992). Low self-esteem parents might not be able to serve as valuable self-confident role-models for their growing-up children making them less capable of transmitting positive, self-confident and assertive self-views in the next generation of adolescents, who themselves face difficult situations as they grow up. Furthermore, parents with a history of depression may expose their children not only to self-, but also to child-directed criticism which potentially leads to an increased risk of developing low self-worth (Beck et al., 1979; Garber & Cole, 2010; Goodman & Gotlib, 1999). The hypothesized intergenerational scar effect would then be mediated via low self-esteem in G1 adults.

Besides G1 adult depressive symptoms and low self-esteem as potential mediators in the intergenerational transmission process, the current familial context might serve as an additional mediator in the explanatory chain between G1 adolescent depressive symptoms/low self-esteem and G2 adolescent depressive symptoms/low self-esteem. Theoretically, parent-child relationship quality has been discussed as a mechanism that contributes to intergenerational transmission of depression via negative interactions between parent and child (Cummings & Davies, 1994). Indeed, in a cross-sectional study, Hammen, Shih, and Brennan (2004) reported entirely mediated effects on youth depressive symptoms via the familial environment and the mother's poor interpersonal skills.. Furthermore, Whitbeck et al. (1992) found depressed mood to be transmitted across generations via parental rejection. The underlying assumption is that depression in parents is expressed by means of self-preoccupation and less warmth and attention in the parenting of offspring

(Whitbeck et al., 1992). Thus, parental depressive symptoms might lead to poor role modeling reducing coping strategies for growing-up individuals to manage age-specific developmental tasks (Davies & Windle, 1997). In a similar line of argumentation, we assumed that G1 low self-esteem in adolescence leads to lower parenting quality in adulthood as parents with low self-esteem might show more insecurity and self-consciousness while interacting with their children, which, in turn, contributes to the development of low self-esteem in the next generation of adolescents. As individuals are in the process of forming a coherent sense of the self during adolescence, self-esteem might be especially sensitive to the social circumstances during this age period (Robins & Trznesniewski, 2005). Adolescents might be quite dependent on a loving and warm relationship with their parents, which provides them with the secure developmental framework to cope with age-specific life tasks. Thus, G1 adolescents may transmit certain personality/behavioral patterns to the next generation of adolescents via their own low quality parent-child interactions.

Intergenerational Continuity Effects

The current study also examined intergenerational continuity effects of depressive symptoms and self-esteem. Indeed, previous research evidenced continuity effects of depression across generations. For example, Hops (1996) found that depressive symptoms replicate across generations, especially in adolescence when the offspring starts to grow into adult roles. Thereby, girls seem to be especially amenable to maternal influences due to their family-orientation whereas boys are more peer-oriented and thus less prone to familial influences (Davies & Windle, 1997; Hops, 1996). For self-esteem, we would expect a similar pattern of intergenerational continuity to occur. For example, Besser and Priel (2005) found intergenerational associations of attachment insecurity and negative evaluations of the self between mothers and daughters that were mediated by depression but not self-criticism. In their study, the children's internal models were assumed to be affected by their mother's

internal model and, as a consequence, to show moderate continuity between mothers and their adult daughters. Likewise, across the three generations examined in their study (grandmothers, mothers, adult daughters), the authors found significant similarities in the levels of self-criticism and other personality measures (Besser & Priel, 2005, p. 1059).

The Present Study

The present study had two major goals. First, we aimed at testing the long-term longitudinal validity of the vulnerability and scar models. That is, we tested whether the effects of self-esteem on depressive symptoms (and vice versa), hold over a time span of three decades from adolescence to middle adulthood. We hypothesized that both the vulnerability and the scar models are valid. Based on current empirical findings (Orth & Robins, 2013; Sowislo & Orth, 2013), we expected the scar effect to be somewhat weaker than the vulnerability effect.

The second major goal of the present study was to investigate the vulnerability and scar models across generations. We investigated whether G1 *adolescent* self-esteem is linked to G2's *adolescent* depressive symptoms (and vice versa). We hypothesized that G1 adolescents with low self-esteem are more likely to later have G2 adolescent children suffering from depressive symptoms compared to G1 adolescents revealing high self-esteem (vulnerability effect). Conversely, we also hypothesized that G2 adolescents would have lower self-esteem if their parents had suffered from depressive symptoms in adolescence (scar effect). We hypothesized that the intergenerational vulnerability and scar effects would be mediated via G1 adult depressive symptoms or self-esteem, respectively. Furthermore, we hypothesized that parent-child discord serves as an additional mediator for the proposed transmission processes.

To the best of our knowledge, this is the first study that tested whether the scar and vulnerability effects are valid over three decades from adolescence to middle adulthood and across generations. We compared the same age groups (G1 adolescence and G2 adolescence) of family members by means of measuring the same constructs three decades later within the main and the children cohort. Furthermore, we obtained data based on information from *both* generations (parent- and child-reported).

In our analyses, we controlled for potential gender effects based on findings indicating that self-esteem is typically higher in males compared to females, especially in adolescence (Kling, Hyde, Showers, & Buswell, 1999; Steiger et al., 2014). Gender effects were also observed for depressive symptoms, especially in adolescence, and have been discussed as a consequence of a higher amount of challenges and risk factors for adolescent girls compared to adolescent boys (Nolen-Hoeksema & Girgus, 1994). We therefore controlled for gender effects in both the long-term and intergenerational models. Furthermore, intergenerational transmission effects have often been shown to be more pronounced in mother-child than father-child pairs (e.g., Besser & Priel, 1995; Hammen, Shih, & Brennan, 2004; Hops, 1996). In order to give consideration to this finding, we therefore tested whether the hypothesized effects would differ between mother-child and father-child pairs. We assumed to find stronger confirmation for the hypothesized intergenerational transmission effects in mother-child pairs.

Method

Participants

Data came from the ongoing German LifE-study (see Author note). The LifE-study began as a *youth study* with an initial sample of 2,054 students who were originally recruited via study participation of schools from the city of Frankfurt and two rural areas in the region of Hessen (West Germany). Individuals were followed annually from age 12 (M_{age} for the initial

measurement point: 12.65, $SD = .55$) to age 16 (years 1979 to 1983, for details see Fend, 1990, 1994). Two follow-up measurement waves took place when participants were in early ($M_{age} = 35.46$, $SD = .57$, year 2002) and in middle adulthood ($M_{age} = 45.71$, $SD = .73$; year 2012). The large majority of the participants grew up in middle class (58.5%), a smaller percentage in lower class (35.2%), and a very small percentage in upper class (6.4%) (see Fend, Berger, & Grob, 2009).

In 2002, the study was resumed and the initial participants were contacted again. Contact details were recruited via the participants' parents whose addresses were recorded during the youth study, leading to 1,853 valid addresses of the main sample (Fend, Berger, & Grob, 2009). Of the 1,853 contacted individuals from the youth study, 1,527 (82.4%) participants returned the questionnaire. Individuals who remained in the sample did not differ to the original youth sample on any of the key psychological variables such as depressive symptoms or self-esteem. The remaining sample, however, was slightly better educated compared to a representative study of the Western German population (see Fend, Grob, & Berger, 2009; Blohm, Harkness, Klein, & Scholz, 2004). With regard to the lowest level of education (Certificate of Secondary Education with lowest level of requirements), only 18.5% of the study participants (compared to 24.8% of the Western German population) belonged to this group. Compared to the Western German population with 34.2% individuals holding a secondary school level I certificate (German: Mittlere Reife), 42.3% the study participants had received such a certificate (for details see Fend, Grob, & Berger, 2009). With regard to the highest education level, the percentage of individuals (39.2%) holding a general qualification for university entrance (German: Abitur) was comparable to the Western German population (41.0%). Another decade later, in 2012, the second follow-up survey was conducted. In an extensive address search, 1,638 addresses of the original sample were identified and 1,599 (97.6%) of these were shown to be valid. From the initial study participants ($n = 2,054$), 66.1 percent participated in the last measurement wave in 2012 ($n =$

1,359, 85.0 % of addressed participants in 2012). Of these, 50.6 % were female, 65.3 % were married, 18.6 % were single, 15.5 % were divorced or separated and 0.7 % of the participants were widowed. 16.1 % had a background of migration (at least one parent did not originate from Germany) and the vast majority of the participants (78.7 %) had children.

For the second follow-up survey in 2012, the now growing up children of main cohort were included in the study. Balanced by gender and restricted to a comparable age range to the original youth sample (for reasons of comparability with the original youth sample only children between the ages of 12 and 17 were taken into consideration), one child per family was randomly selected resulting in a total of 703 adolescents that were addressed. Of these, 581 (84.8%) G2-participants ($M_{\text{age}} = 14.9$, $SD = 1.60$ years, 52.2 % female) returned the questionnaire. For the intergenerational analyses of our hypotheses, 572 complete parent-child pairs existed. These pairs consisted of 309 mother-child (54.0%) and 263 (46.0%) father-child pairs.

For this study, we used data from the age 16 and age 45 measurement occasions only, because depressive symptoms were not measured in the first four measurement occasions (age 12 – 15) and self-esteem was not measured at age 35. To test the competing effects of the vulnerability and scar models, we were therefore restricted to the age 16 (1983) and age 45 (2012) measures (in the following we refer to age 16 as T1, and age 45 as T2). Attrition analysis for the self-esteem measures revealed that individuals who continued to be part of the study at age 45 (T2) did not differ from those who participated at age 16 (T1), $F(1) < 1$. With regard to depressive symptoms, participants at T2 did not differ from those who had dropped out of the study after age 16, $F(1) < 1$. The second generation of adolescents who participated at T2 completed the same scale measuring depressive symptoms as the adult sample as well as the same self-esteem scale as the adult sample.

Measures

Global self-esteem. Self-esteem was measured with six items representing a sense of self-acceptance and self-worth (with two items identical and two items similar to the Rosenberg Self-Esteem Scale; for details see Fend, Berger, & Grob, 2009; Steiger et al., 2014). Participants rated each item on a dichotomous scale (0 = *disagree*, 1 = *agree*). At T1 (age 16) eight items were administered to the participants, however, due to space limitations in the questionnaire, only the most reliable six of the original eight items were used for the adult and the children questionnaire at T2. In order to have identical measures for both measurement occasions and both samples, we only included the identical items in our analyses. This resulted in a total of six items that were administered to both samples (G1 and G2) and both measurement occasions (T1 and T2). Kuder-Richardson (1937) reliability estimates (KR-20) were .77 for age 16 (T1), .78 for G1 (T2), and .78 for G2 (T2) respectively. Items were “Overall, I’m satisfied with myself”, “I think I am a person of worth”, “Sometimes I feel like I am not important at all”, “Sometimes I feel somewhat superfluous”, “Sometimes I wish I would be totally different”, and “In general, I would like to stay the way I am”.

Depressive symptoms T1 (age 16). At T1, 13 items from the original Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961; for details see Fend, Berger, & Grob, 2009; Steiger et al., 2014) were administered to the participants to measure depressive symptoms (note that depressive symptoms were not measured in the age 12 to 15 assessments). Participants indicated which sentence out of four possible answers reflected their feeling most accurately. This was done for each of the 13 symptoms. An example item is “I’m not feeling sad at all” (0) to “I’m extremely sad and unhappy; I can hardly bear it” (3). We excluded six items of this scale because they were conceptually distinct compared to the seven items used at T2. The reliability estimate (Cronbach’s alpha) of this brief measure was .82.

Depressive symptoms T2 (Age 45 and adolescent children). At T2, seven conceptually identical items from the depressive symptoms scale used at T1 were administered to the adult and the adolescent sample. In the follow-up surveys, an adapted but well-established version of the BDI was used, namely the BDI-V version (Schmitt & Maes, 2000; for a detailed discussion on the comparability between the two scales see Steiger et al., 2014). The seven items were “I feel sad”, “I am tired and fatigued”, “I have to force myself into doing things”, “I feel discouraged about the future”, “I am disappointed in myself”, “I have thoughts of killing myself”, and “I have lost interest in people” (1 = *never* to 6 = *always*). The reliability estimates (Cronbach’s α) were .86 (adult sample, G1) and $\alpha = .80$ (children sample, G2).³

Discord between parent and child (parent and child-reported). Three items indicated the frequency of discord, tension and conflicts between parent and child (Schneewind & Ruppert, 1992). Items are “Between me and my child are loud and heavy fights”, “Between me and my child there are tensions and ill-feelings” “Between me and my child, small arguments lead to a bad atmosphere”. Participants indicated on a six-point scale the frequency of the described occurrences from “*never*” (1) to “*always*” (6). The scales ranged from 3 to 18, with higher rates indicating more discord. The same items were administered to the G2 adolescent sample, but adolescents were asked to indicate each item separately for their mother and father, respectively.. Reliability estimates for this scale was well for both the adult ($\alpha = .85$) and the adolescent sample reporting on discord with their mothers ($\alpha = .86$) and their fathers ($\alpha = .85$), respectively.

Plan of Analysis

We estimated cross-lagged regression analyses (Jöreskog, Sörbom, & Magidson, 1979; Kenny, 1975) using MPlus (Muthen & Muthen, 1998 - 2010) with latent self-esteem and depressive symptoms factors to correct for measurement errors (see Figures 1-3). The six self-esteem items were allocated to two parcels (consisting of the mean scores of three items per

parcel) that served as indicators for each measurement occasion and the seven depressive symptoms items were allocated to three parcels (consisting of the mean scores of three or two items per parcel) as indicators for each latent depressive symptoms factor. Self-esteem and depressive symptoms parcels were built according to the item-to-construct-balancing method (Little, Cunningham, Shahar, & Widaman, 2002). The latent construct of parent-child discord was built using the three parent-reported single items as observed indicators. For our gender specific analyses, the child-reported items on discord with the mother or the father, respectively, were used as observed indicators. Based on the suggestions by Geiser (2011) and Selig, Preacher and Little (2012) for the specification of latent autoregressive cross-lagged models, loadings and intercepts of the corresponding parcels were set equal across time.

Long-term vulnerability and scar effects. We investigated *long-term* associations of self-esteem and depressive symptoms over time (see Figure 1). That is, we tested the influence of adolescent self-esteem on depressive symptoms in middle adulthood, controlling for the stability of self-esteem over time. At the same time we tested the influence of adolescent depressive symptoms on self-esteem in middle adulthood, controlling for the stability of depressive symptoms over time. Self-esteem and depressive symptoms were allowed to covary at T1 and T2. In the first model, we did not include any control variables whereas in the second model we controlled for gender for each of the latent variable. As the results remained virtually identical with and without gender as covariate, only the results of the model that controlled for gender are reported.

Intergenerational vulnerability and scar effects. We tested the vulnerability and scar effect across generations (see Figure 1). That is, we modeled G2 adolescent self-esteem and depressive symptoms as dependent variables and tested the influence of G1 adolescent self-esteem and depressive symptoms on G2 adolescent self-esteem and depressive symptoms, respectively. We then entered G1 gender as controls for G1 self-esteem and G1 depressive

symptoms and G2 gender as a control for the G2 latent constructs. As results remained virtually identical with and without gender as covariate, we only report the model that controlled for gender.

Mediation effects. First, we tested whether G1 adult self-esteem and G1 adult depressive symptoms would serve as mediators for transmission effects across generations. Thus, we extended Figure 1 by integrating G1 adult depressive symptoms and self-esteem for the links between self-esteem and depressive symptoms across generations (Mediation Model 1, see Figure 2). Second, we further included parent-child discord as an additional potential mediator between G1 adolescent self-esteem and depressive symptoms and G2 adolescent self-esteem and depressive symptoms, respectively (Mediation Model 2, see Figure 3). Finally, we tested a grouped model for mother-child and father-child pairs in order to test differences between intergenerational transmission effects by gender. We employed a bootstrapping approach with 5000 samples to test the significance of the indirect effects (Preacher & Hayes, 2008) and we report bias-corrected bootstrap 95% confidence intervals.

Results

Long-term vulnerability and scar effects. Table 1 includes descriptive statistics and zero-order correlations of the study variables. Figure 1 (top figure) reports the long-term stability coefficients and long-term cross-lagged effects as described in the plan of analysis, controlling for possible gender effects. The long-term vulnerability and scar model exhibited a good model fit, $\chi^2(36) = 178.57, p < .001, CFI = .972, RMSEA = .054$ (90% CI = .046-.062). Both self-esteem and depressive symptoms were shown to be moderately stable over time and both the vulnerability effect and the scar effect were shown to be valid across three decades (see Figure 1). Gender as control variable and self-esteem were moderately associated at age 16 ($\beta = .24, p < .001$), favoring males over females. No gender differences were found for G1 adolescent depressive symptoms, self-esteem at age 45 and depressive symptoms at age 45. We tested whether the vulnerability and scar effects significantly differed in effect size by

comparing a model with equal effects compared to a model with freely estimated vulnerability and scar effects. A comparison between the models revealed a significant difference in χ^2 , in support of the model that estimated the effects freely $\Delta\chi^2 = 20.50$, $\Delta df = 1$, $p < .001$. This indicated a stronger effect for the vulnerability model.

Intergenerational vulnerability and scar effects. The model including gender as a covariate evidenced a good fit, $\chi^2(46) = 83.78$, $p < .001$, CFI = .981, RMSEA = .038 (90% CI = .025-.051). The results did not support the claim for vulnerability or scar effect across generations (see Figure 1, bottom figure). That is, G2 self-esteem in adolescence was not influenced by G1 adolescent depressive symptoms nor were G2 adolescent depressive symptoms influenced by G1 adolescent self-esteem. We found a moderately strong direct transmission effect from G1 adolescent depressive symptoms to G2 adolescent depressive symptoms (see Figure 1). G1 self-esteem was significantly associated with gender, again favoring males over females ($\beta = .30$, $p < .001$), as was G2 self-esteem ($\beta = .14$, $p < .01$). Consistent with the literature, G2 depressive symptoms were slightly more pronounced in females than males ($\beta = -.14$, $p < .01$).

Potential mediating mechanisms. We first performed mediation analyses with G1 adult depressive symptoms and self-esteem as possible mediators between G1 adolescent and G2 adolescent self-esteem and depressive symptoms (see Figure 2). The model fitted well, $\chi^2(96) = 171.77$, $p < .001$, CFI = .977, RMSEA = .037 (90% CI = .028-.046). The direct transmission effect from G1 adolescent to G2 adolescent depressive symptoms remained virtually identical compared to the unmediated model. G1 adult depressive symptoms did not serve as a mediator between G1 adolescent and G2 adolescent depressive symptoms, as the 95% confidence intervals included zero. The same was true for G1 adult self-esteem and for the proposed intergenerational vulnerability and scar effects. The mediation analyses further revealed non-significant indirect results (for details see SOM, Mediation Model 1).

We then included parent-child discord as an additional mediator in the model (see Figure 3). The model evidenced a good fit, $\chi^2(141) = 245.42, p < .001, CFI = .975, RMSEA = .036$ (90% CI = .029-.044). Over the time span of three decades G1 adolescent self-esteem was negatively related to parent-child discord at age 45. As for the hypothesized intergenerational vulnerability and scar effects, we did not find evidence for a direct or indirect vulnerability nor a direct or indirect scar effect (see Figure 3 and SOM for direct and indirect effects). The direct effect from G1 adolescent depressive symptoms to G2 adolescent depressive symptoms remained the same (see Figure 3). Our analyses indicated that parent-child discord did not serve as the mediator between adolescent G1 and G2 depressive symptoms nor between adolescent G1 and G2 self-esteem (see SOM for detailed results of indirect effects).

Gender differences. In our final model, we tested a grouped mediation model to examine whether the hypothesized effects would differ by gender (mother-child vs. father-child pairs). This model had an adequate fit, $\chi^2(226) = 353.61, p < .001, CFI = .969, RMSEA = .044$ (90% CI = .035-.053). Interestingly, we found that the direct transmission effect of depressive symptoms disappeared in father-child pairs ($\beta = .11, p = .48$) but became even stronger in mother-child pairs ($\beta = .30, p < .05$). In line with our previous models we did not find evidence for direct intergenerational vulnerability or scar effects in either the mother-child (vulnerability effect: $\beta = .11, p = .23$; scar effect: $\beta = -.06, p = .65$) or the father-child pairs (vulnerability effect: $\beta = .09, p = .57$; scar effect: $\beta = .01, p = .95$). With regard to the mediating mechanisms, we did not find evidence that G1 adult depressive symptoms, self-esteem or parent-child discord served as a mediator for the hypothesized vulnerability or scar effect in mother-child or father-child pairs. Finally, none of proposed mediating mechanisms accounted for the direct intergenerational transmission effect of G1 to G2 adolescent depressive symptoms. Taken together, we did not find evidence for any of the proposed mediated mechanisms even when differentiating between mother-child and father-child pairs.

Discussion

The present study examined whether the vulnerability and scar models are valid from adolescence to middle adulthood and across two generations. As a first goal, we examined the long-term vulnerability and scar effects from adolescence to middle adulthood. The results showed that individuals suffer from the consequences of low self-esteem and depressive symptoms as they move through different developmental stages of their life. Low adolescent self-esteem was substantially related to adult depressive symptoms at age 45. That is, the vulnerability effect was confirmed from adolescence up to middle adulthood. The scar model was also confirmed, albeit with weaker effects compared to the vulnerability model. The current findings are in line with our previous longitudinal results using the same data set until *age 35*, where we showed that self-esteem in adolescence prospectively predicts early adult depressive symptoms (Steiger et al., 2014). Our findings are also in line with previous albeit shorter longitudinal studies that found the vulnerability effect to be about twice as large as the scar effect (Orth & Robins, 2013; Sowislo & Orth, 2013). The current results clearly contribute to a better understanding of the *long-term* relevance of adolescent self-esteem and depressive symptoms across the lifespan. The larger effect of self-esteem on depressive symptoms points to the importance of building up a coherent sense of the self during adolescence (a critical age period for identity development, Erikson, 1968). As identity processes consolidate at the end of adolescence it might become more and more difficult to bolster self-esteem with increasing age. Therefore, during adolescence, building up self-esteem in the process of identity formation, might be regarded as sensitive and crucial.

As a second goal, we tested the validity of the proposed intergenerational vulnerability and scar effects but we did not find support for these effects. Furthermore, none of the proposed mediating mechanisms via G1 adult self-esteem, depressive symptoms and/or parent-child discord were supported. However, such effects are still possible over shorter time

periods as the time span of three decades might be too long to detect such effects. Future studies might investigate intergenerational vulnerability and scar effects in studies over brief time periods to examine the dynamics between parents and their children with regard to self-esteem and depressive symptoms. Furthermore, it is important to note that adolescence is a time of new social orientation (towards peers and away from the family). As such, it is possible that effects might be easier to detect earlier in life when family orientation is stronger.

With regard to the continuity effects across generations, we found a moderately strong direct continuity effect of G1 adolescent to G2 adolescent depressive symptoms. This direct transmission effect of depressive symptoms from G1 to G2 adolescence remained unaltered even after including potential mediators (i.e. adult depressive symptoms and self-esteem). This is a remarkable finding considering the time period of three decades between the measurement of G1 adolescent depressive symptoms (year 1983) and G2 adolescent depressive symptoms (year 2012). Indeed, real intergenerational transmission effects are only given (a) if the parent and the child are studied with a *time-delay*, (b) if *both* members of the family are questioned and (c) if the concurrent association between G1 and G2 is considered in the model (Baier & Hadjar, 2004). Many studies claim testing intergenerational transmission effects, however, often they simply report concurrent similarities between family members as values or attitudes are questioned at the same measurement occasion (e.g., Knafo & Schwartz, 2001; Phalet & Schönplflug, 2001). Our sample is therefore unique because it consists of former adolescents, the same individuals as grown-up adults (aged 45) three decades later and their children (in adolescence), and finally, information was acquired from both informants, that is, from parents and children.

How can we explain the intergenerational transmission effect for depressive symptoms? There are several possible pathways for intergenerational transmission effects. First, it is

possible, that depressive symptoms are “passed on” to the next generation via genes or epigenetic effects. That is, similarities between family members might be explained by shared genes because they reflect the basis of both the parental and child personality (for reviews, see Plomin, DeFries, McClearn, & Rutter, 1997; Rutter, 2006) or certain experiences during sensitive age periods can result in epigenetic alterations that, in turn, influence pathological development (Rutten & Mill, 2009). Finally, environmental factors that we were unable to test might be, in part, responsible for the direct transmission effects found in this study. We proposed parent-child discord as one possible mediating mechanism. However, our measure of parent-child discord focused on bad atmosphere and tension between parent and child which might be quite common in parent-child relationships during this age period. As such, more subtle measures might capture a negative family atmosphere combined with parental rejection and/or miscommunication and little warmth better, possibly clarifying the explanatory chain from G1 to G2 adolescent depressive symptoms. As suggested by earlier studies testing transmission processes of depression via parental rejection, interpersonal stress and family discord (Davies & Windle, 1997; Hammen, Shih, & Brennan, 2004; Whitbeck et al., 1992), future research should include additional mediators such as little warmth, little attention, low affection and bad communication between parents and children to unravel the underlying intergenerational transmission patterns. Our gender-specific analyses with regard to mother-child and father-child dyads revealed that only the mother-child dyads showed the direct intergenerational transmission effect for depressive symptoms. With regard to the indirect mechanisms, the grouped model demonstrated the same results as our previous models revealing null effects for the proposed mediators. This was true for both the mother-child and the father-child pairs. This finding further points to the relevance of studying genetic underpinnings of depressive symptoms as it was irrelevant for the transmission effect whether the mother suffered from depressive symptoms at age 45 (concurrently to the measure of depressive symptoms in G2). Rather, it was only relevant for the next generation

of adolescents whether the mother had suffered from depressive symptoms during her *adolescent* years. These findings, however, do not explain whether the direct transmission effect in mother-child pairs must be regarded as genetic, epigenetic or environmental. Therefore, future longitudinal studies should aim at understanding this interesting effect in greater detail.

With regard to intergenerational continuity of self-esteem, no effects were found. Compared to depressive symptoms which may be quite strongly influenced by a history of familial pathology, it is likely that self-esteem is more amenable to the current social situation. As adolescence is a time of strong peer-orientation, peer popularity may lead to positive self-views rather than the parent-child relationship or the parental history of self-esteem formation. It is likely, too, that due to the identity processes that are taking place during this age period, most adolescents deal with some self-consciousness but only a few of them suffer from depressive symptoms. Indeed, self-esteem in adolescence differs from self-esteem in childhood (or from later developmental periods such as adulthood), insofar as the mean-level of self-esteem typically drops during adolescence (Robins & Trzesniewski, 2005). Also, the rank-order stability of self-esteem is lower in adolescence compared to other age periods suggesting that it is more vulnerable to specific environmental influences (Trzesniewski, Donnellan, Robins, 2003). Indeed, self-esteem is considered to become more trait-like with increasing age (Donnellan, Kenny, Trzesniewski, Lucas, & Conger, 2012). Therefore, future studies might focus on later periods of self-esteem transmission processes when individuals have a more coherent view of the self.

Taken together, several factors (e.g., measure of family discord, the long time period, initial age of participants) might have been responsible for the null findings with regard to the proposed intergenerational transmission processes. Future studies should include genetic, personality, and behavioral variables to account for genetic and epigenetic factors (e.g.,

testing the impact of early trauma) along with environmental, behavioral and personality developmental patterns across the lifespan, ideally by means of a cohort-sequence study design that can test intergenerational transmission patterns at different developmental periods.

Limitations

Although this study had several major advantages including the longitudinal scope from age 16 to age 45, the inclusion of two generations in a large sample size and advanced statistical modeling, several limitations must be noted. First, the depressive symptoms measures differed slightly from T1 and T2. Note, however, that we extracted seven conceptual identical items for our analysis and that the new measure (BDI-V, Schmitt & Maes, 2000), is based on the original BDI depression scale. These scales have been extensively tested against each other, revealing very similar results (Schmitt et al., 2003; for a detailed discussion on the comparability of the two scales, see Steiger et al., 2014). Furthermore, with regard to our measure of depressive symptoms, it must be noted that the BDI scale is not a measure for a thorough diagnosis of major depressive disorder but rather represents a continuum of depressive symptoms. It would be interesting to replicate the current findings in a clinical sample and/or with informant-based measures of depression.

Second, the potential mediating variables were measured concurrently to the dependent constructs (both at T2). That is, even if we had found evidence for mediating effects across generations, it must be noted that a causal interpretation of such mechanisms would have been critical as it could be the case that G2 and G1 self-esteem and depressive symptoms mutually influence each other at T2.

Finally, future studies should devote more attention to possible gender effects. Even though we estimated a grouped mediated model for mother-child and father-child dyads, the focus of this study lay in testing mediating mechanisms of the vulnerability and scar model

across generations. Our results, however, point in the direction that mother-child pairs reveal stronger direct transmission effects for depressive symptoms compared to father-child pairs. We are planning on testing and discussing the diverging finding with regard to the transmission of depressive symptoms between mother-child and father-child pairs in further detail in another study.

Conclusions

Our findings have major theoretical and practical implications. First, low self-esteem and high depressive symptoms must be considered not only as short-term but as life-long risk factors that tend to be effectual across different developmental stages. Intervention studies may be more concerned with boosting self-esteem than with lowering depressive symptoms because the vulnerability effect has been shown to be stronger than the scar effect. Second, our study revealed that depressive symptoms in one generation of adolescents are related to the next generation's level of depressive symptoms but no transmission effect for self-esteem occurred. These findings suggest that depressive symptoms might be more strongly influenced via genetic pathways whereas self-esteem is more likely to be formed through the experiences individuals make as they move through different developmental stages of their life. Future studies might test additional mediating mechanisms as proposed above that possibly account for transmission effects of self-esteem and depressive symptoms across generations.

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Table 1

Zero-Order Correlations for Self-Esteem, Depressive Symptoms and Parent-Child Discord Scales in Adolescence and Adulthood

	1	2	3	4	5	6	7	8	9
1) Self-Esteem Adolescence G1	-								
2) Self-Esteem Adulthood G1	.298**	-							
3) Self-Esteem Adolescence G2	.028	.103*	-						
4) Depressive Symptoms Adolescence G1	-.345**	-.170**	-.058	-					
5) Depressive Symptoms Adulthood G1	-.242**	-.636**	-.138**	.180**	-				
6) Depressive Symptoms Adolescence G2	-.039	-.087*	-.616**	.149**	.170**	-			
7) Discord with Child	-.144**	-.190**	-.192**	.091	.281**	.191**	-		
8) Discord with Mother ^d	-.083	-.064	-.264**	.114*	.094*	.386**	.406**	-	
9) Discord with Father ^d	-.067	-.022	-.329**	.007	.082	.309**	.328**	.384**	-
Potential Range	6-12	6-12	6-12	0- 21	7-42	7-42	3-18	3-18	3-18
<i>M</i>	10.29	10.94	10.59	2.37	13.86	14.46	7.20	7.72	7.13
<i>SD</i>	1.77	1.53	1.69	3.30	4.95	5.03	2.17	2.99	2.82

Note. * $p < .05$, ** $p < .01$. G1 = Generation 1, G2 = Generation 2. $N = 1,359$ for main sample, $N = 581$ for Generation 2 adolescent sample, ^dchild-reported.

Figure 1. Cross-lagged regression analysis testing the long-term (top figure) and intergenerational (bottom figure) vulnerability and scar effect, standardized beta-coefficients and (residual) correlations. Both models controlled for gender for each latent variable. G1 denotes Generation 1, G2 denotes Generation 2. ⁺ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

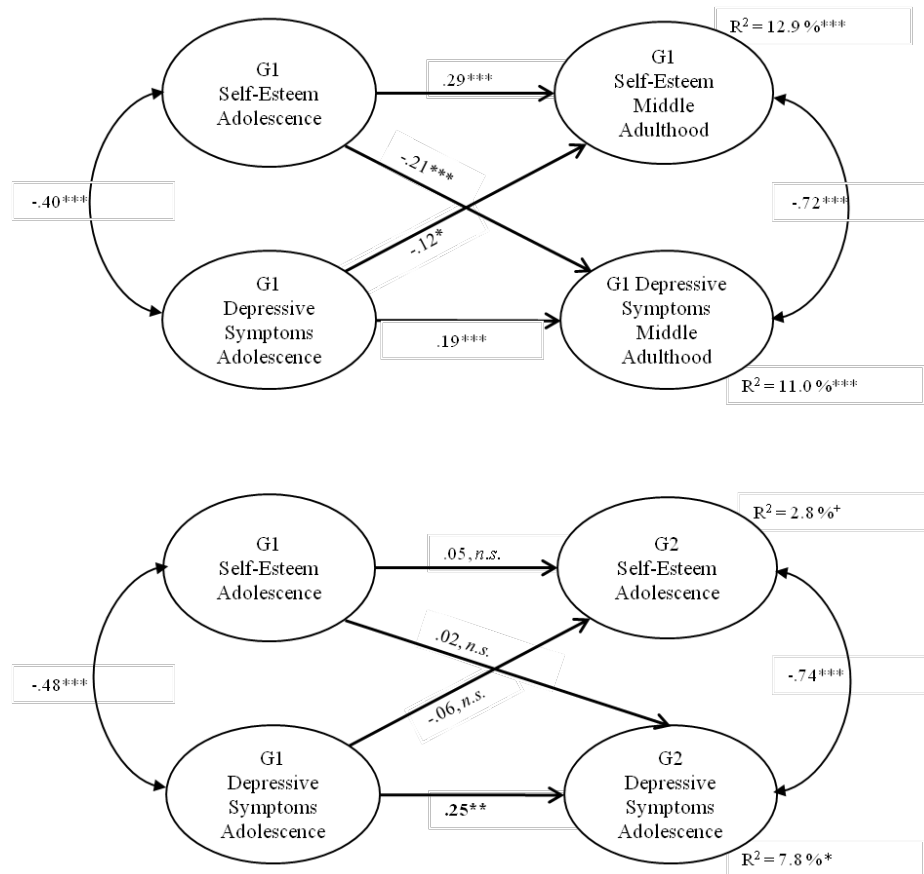


Figure 2. Cross-lagged regression analysis testing the vulnerability and scar effect of self-esteem and depressive symptoms across generations with G1 adult self-esteem and depressive symptoms; standardized beta-coefficients and (residual) correlations, controlling for gender (see SOM, Model 1). G1 denotes Generation 1, G2 denotes Generation 2. G1 denotes Generation 1, G2 denotes Generation 2. * $p < .05$, ** $p < .01$, *** $p < .001$.

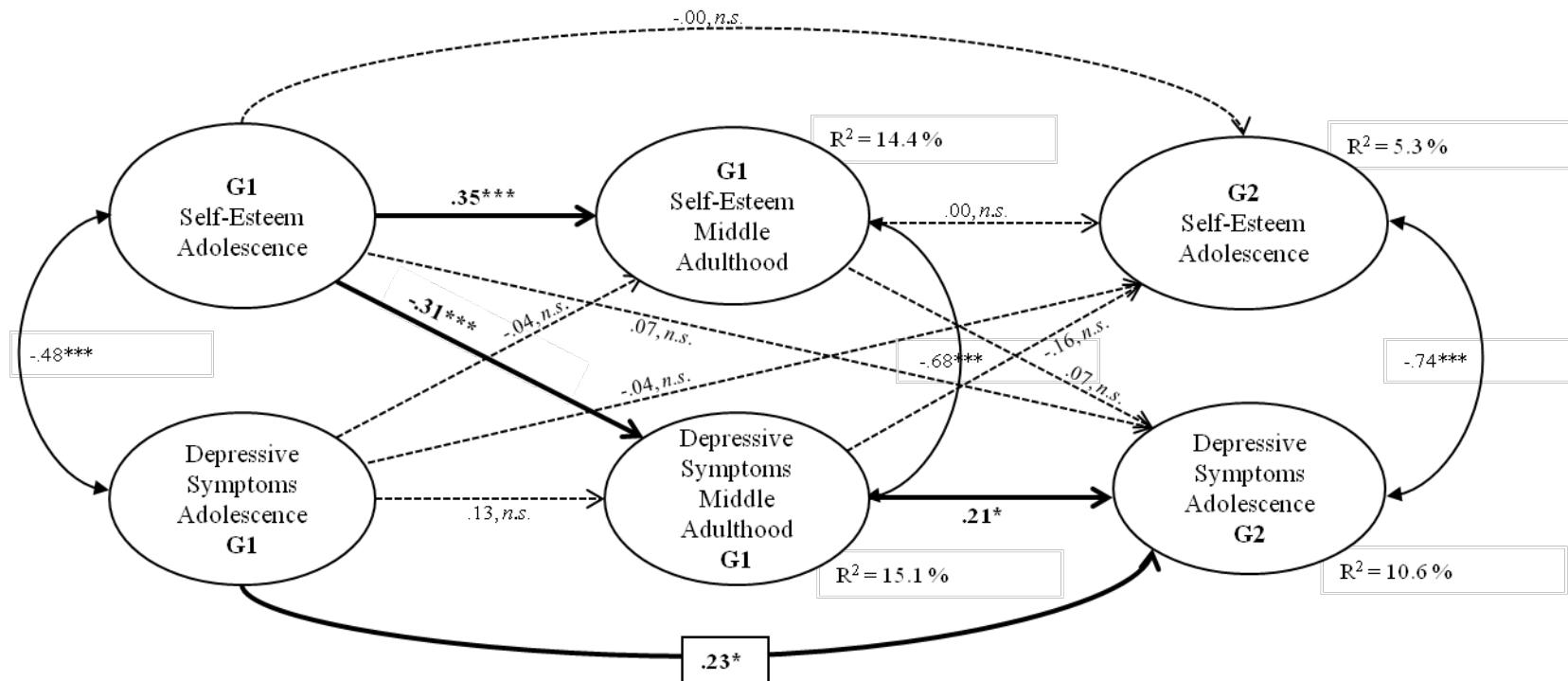


Figure 3. Cross-lagged regression analysis testing the vulnerability and scar effect of self-esteem and depressive symptoms across generations with G1 adult self-esteem and depressive symptoms and parent-child discord as mediators; standardized beta-coefficients and (residual) correlations, controlling for gender, (see SOM, Model 2). G1 denotes Generation 1, G2 denotes Generation 2. * $p < .05$, ** $p < .01$, *** $p < .001$.

