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Do Dispositional Pessimism and Optimism Predict Ambulatory Blood Pressure During Schooldays and Nights in Adolescents?

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Abstract

We tested the hypotheses that (1) high pessimism and low optimism (LOT-R overall and subscale scores) would predict high ambulatory blood pressure (ABP) level and 24-hour load (percentage of ABP values exceeding the pediatric 95th percentile) among healthy Black and White adolescents (n = 201; 14–16 yrs) across 2 consecutive school days and (2) that the relationships for the pessimism and optimism subscales would show nonlinear effects. The hypotheses were confirmed for pessimism but not for optimism. The results suggest that high pessimism may have different effects than low optimism on ABP and that even moderate levels of pessimism may effect blood pressure regulation. These results suggest that optimism and pessimism are not the opposite poles on a single continuum but ought to be treated as separate constructs.

Optimistic life orientation denotes a tendency to believe that good things as opposed to bad things will generally occur in one's life in a wide variety of settings. In contrast, pessimism denotes a tendency to believe that bad things will generally occur in one's life in a wide variety of settings. Consequently, optimists are likely to see the desired outcomes as attainable and to persist in their goal-directed efforts, while pessimists are more likely withdraw effort, become passive, and potentially give up on achieving their goals (Scheier & Carver, 1985). Accordingly, optimists do fare better psychologically in general, as well as during stressful circumstances, than do pessimists (for a review, see e.g., Scheier & Carver, 1985, 1992, 2003a, 2003b; Scheier, Carver, & Bridges, 2001).

The dispositional optimistic-pessimistic orientation is often measured by the Life Orientation Test (LOT: Scheier & Carver, 1985, or LOT-Revised; Scheier, Carver, & Bridges, 1994), with optimism and pessimism as bipolar opposites on a single dimension. Confirmatory factor analytic studies of the LOT and LOT-R generally favor a bidimensional solution (LOT: Kubzansky, Kubzansky, & Maselko, 2004; Marshall, Wortman, Kusulas, Herving, & Vickers, 1992; Robinson-Whelen, Kim, McCallum, & Kiecolt-Glaser, 1997; LOT-R: Scheier et al., 1994) in which optimism and pessimism are somewhat distinct. This raises important theoretical questions: Is it healthier to be optimistic or not to be pessimistic? Is it healthier psychologically to be both optimistic and not pessimistic (Robinson-Whelen et al., 1997).

The empirical evidence is not clear with regard to optimism/pessimism and psychological characteristics, symptoms, and health behaviors. Kubzansky et al. (2004) showed that

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among university undergraduates low optimism and high pessimism were equally strongly and independently correlated with anxiety, anger, and depression, but high optimism predicted better self-rated physical health and less frequent self-reported doctor visits, whereas high pessimism predicted more frequent self-reports of gastrointestinal problems and aches. Mroczeck, Spiro, Aldwin, Ozer, and Bosse' (1993) showed that among the participants of the Normative Aging Study, low optimism was associated with hassles, while pessimism was not, and low optimism and high pessimism were associated with self-reports of psychological symptoms and illness severity (see also Lai, 1994; Marshall et al., 1992). These findings, while of interest, rely on self-reports that are determined by complex interactions among environmental factors, cognitive processes, and person characteristics.

Another window to understanding whether it is important to distinguish between optimism and pessimism in relation to health is to assess psychophysiological processes during everyday circumstances (Cacioppo & Tassinary, 1990). To our knowledge, only one study has examined optimism and pessimism in relation to ambulatory psychophysiological responses, namely ambulatory blood pressure (ABP). This study found that healthy, middle-aged, employed adults who scored low on the optimism subscale had higher average ABP levels across three days than had the more optimistic adults (Räikkönen, Matthews, Flory, Owens, & Gump, 1999). Moreover, during the few times when the more optimistic adults reported their mood as negative, their ABP levels were as high as those observed among the less optimistic adults. Pessimism subscale scores were not associated with ABP. This study did not record ABP while participants slept.

The present study extends our understanding of the distinctive roles of optimism and pessimism in the context of ABP during 2 school days and an intervening night of African American and European American adolescents. Thus, the present study adds to the literature in a number of ways. Not only does it offer an opportunity to replicate prior findings obtained in one study of employed middle-aged adults, but it also examines the roles of optimism and pessimism in a different and perhaps more homogeneous “work” context, that is, multiple days at school. Second, it examines for the first time whether optimism and pessimism alter the normal wake-sleep cycle of ABP, that is, affect nighttime ABP. Third, it extends the adult findings to a different age group and a multiethnic sample. Fourth, although more optimistic adolescents (on a bipolar scale) do report more positive and less negative affect, depression, hopelessness, suicidal ideation, and substance abuse (Ben-Zur, 2003; Carvajal, Clair, Nash, & Evans, 1998; Chang & Sanna, 2003; Roberts, Roberts, & Chen, 1998), no study has examined the distinctions between optimism and pessimism in adolescents. The present study addresses this void.

Finally, the present study adds to a small, but important literature on the psychosocial factors associated with the development of risk for high blood pressure (BP) in adolescents. BP measured in childhood predicts subclinical carotid artery atherosclerosis decades later (e.g., Li et al., 2003; Raitakari et al., 2003; Vos et al., 2003), and BP, and 24-hour ABP, in particular, shows a high degree of tracking over different developmental stages, that is, individuals retain their rank over time relative to others in the population (e.g., O'Sullivan, Derrick, & Foxall, 2000; Fuentes, Notkola, Shemeikka, Tuomilahto, & Nissinen, 2002; Vos et al., 2003). ABP predicts target end organ damage among mildly hypertensive (Belsha et al., 1998) and untreated hypertensive children (Sorof, Cardwell, Franco, & Portman, 2002). ABP at night may be a particularly important predictor of cardiovascular events (Pickering, Shimbo, & Haas, 2006; Staessen et al., 1999).

A secondary objective of our study was to examine whether the effects of optimism and pessimism are linear, curvilinear, or threshold in nature. Most hypotheses are phrased in terms of expecting a graded relationship, such that having highly pessimistic attitudes is worse than having moderately pessimistic attitudes, which, in turn, is worse than having low pessimistic attitudes. Similarly, having highly optimistic attitudes is thought to be better than having moderately optimistic attitude, which, in turn, is thought to be better than having low optimistic attitudes. Analyses are accordingly linear tests. However, it may be that for some outcomes, even a moderate level of pessimism can have a negative effect, whereas only a high level of optimism can have a positive effect. Thus, findings regarding the effects of the subscales would be inconsistent because of different thresholds for optimism and pessimism. In partial support of considering a threshold effect are findings from Matthews, Räikkönen, Sutton-Tyrell, and Kuller (2004). Among initially healthy women, those who scored in the most optimistic quartile of LOT total scores did not show any progression in carotid intima-medial thickness, a measure of early subclinical cardiovascular disease, whereas the women who scored in the upper three quartiles showed similar and significant increases in carotid intima-medial thickness. There is also evidence that a curvilinear relationship may depict the association of optimism/pessimism with health: In HIV patients on antiretroviral therapy, a higher CD4 cell count, which indicates a less advanced disease status at 8 months, was most apparent among those patients who had moderate levels of optimism (Milam, Richardson, Marks, Kemper, & McCutchan, 2004).

Because previous findings yielding no consistent pattern of results favoring low pessimism over high optimism in predicting subjective psychological or physical well-being (e.g., Kubzansky et al., 2004; Mroczeck et al., 1993), we hypothesized that both high pessimism and low optimism subscale scores would be associated with higher ABP levels in adolescents going about their usual activities during normal schooldays and that the associations would remain statistically significant when adjusting for nonpsychological determinants of blood pressure, e.g., body mass index and postural change. Furthermore, we hypothesized that adolescents scoring high on pessimism and low on optimism subscales would exhibit higher ABP levels in general but especially when they experienced more negative mood and events. We explored whether adolescents with high pessimism and low optimism would exhibit disruptions of the usual wake-sleep cycle of ABP, that is, would have elevated nighttime ABP. Because some suggest that the predictive power of dispositional optimism and pessimism merely reflect overlap with negative affectivity (Smith, Pope, Rhodewalt, & Poulton, 1989), we tested whether these relationships remain when adjusting also for negative affectivity.

METHOD

Participants

Participants included 217 healthy adolescents, aged 14 to 16 years, recruited from two multiethnic high schools in Pittsburgh, Pennsylvania. Participants were enrolled in the freshman and sophomore health education classes in approximately equal numbers of African American and Caucasian, and boys and girls. Eligible adolescents had no congenital heart disorders or history of other cardiovascular or renal disease, were not using prescription medications affecting the cardiovascular system or recreational drugs, had no severe learning disabilities, mental retardation, or psychiatric disorders, and were willing to not smoke for 12 hours prior to the physiological testing. The University of Pittsburgh approved the project; all participants and their parent(s) gave informed consent.

Of the 217 adolescents, 212 completed the ABP monitoring, and of them 205 and 201 had valid ABP readings during waking and sleeping hours, respectively. An additional four adolescents had missing data on dispositional optimism-pessimism. Thus, 100 girls (52 White and 48 African American) and 101 boys (50 White and 51 African American) had data available for analyses of ABP during waking hours; 98 girls (50White and 48 African American) and 99 boys (49 White and 50 African American) had data available for analyses of ABP during sleeping hours. Comparison of the adolescents with complete data on all study variables did not differ from the rest of the sample completing the ABP monitoring in sex or ethnicity ($\chi 2(1) = 0.25$, $p = .67$ for both comparisons), age, parental years of education, weight, height or body mass index ($F(1,211)$s < 1.40, *p*s > .31).

Measures

Dispositional Optimism-Pessimism—Optimistic and pessimistic life orientation was measured using the Life Orientation Test-Revised (LOT-R, Scheier et al., 1994). The LOT-R is a six-item, self-report measure (plus four filler items) that evaluates respondents' generalized expectations of negative (three items) and positive (three items) outcomes. Sample items include, "In uncertain times, I usually expect the best," "If something can go wrong for me, it will." The respondents were asked to rate the extent to which they agreed with the items on a 5-point scale ranging from *strongly disagree* (0) to *strongly agree* (4). Subsequent to reverse scoring, the reverse-scored positive items and the negative ones were summed, a higher total LOT-R score reflecting a more pessimistic life orientation. In addition to the total score, the positively and negatively worded items were summed separately to yield optimism (high scores reflecting more optimistic life orientation) and pessimism (high scores reflecting more pessimistic life orientation) subscale scores. Previous studies have established good construct validity for the LOT-R (Scheier et al., 1994).

In support of the two-factor structure are the data in Table 1, which presents the results of confirmatory factor analysis (CFA). The CFA revealed that the fit for the two-factor solution, with one correlated error specified between two optimism items, was excellent, $\chi 2(8) = 9.031$, $p < .3397$, CFI = .992, RMSEA = .025, and was significantly better than the fit for the one-factor solution ($\chi 2_{diff}$ (1) = 12.02, $p < .001$ for a difference between the two models). Cronbach's alpha reliability for the total LOR-R score was .60, and as estimated via a procedure by Raykov and Shrout (2002; see also, Tarkkonen & Vehkalahti, 2005) for the pessimism subscale .63 and for the optimism subscale .51. The optimism and pessimism subscale scores were correlated significantly ($r = -.27$, $p < .001$).

Trait Anxiety and Trait Anger—Trait anxiety and trait anger were measured by 10 items each from the Spielberger Trait Personality Inventory (Spielberger, Gorsuch, & Lushene, 1970). Sample trait anxiety items include "I feel nervous and restless," "I feel like a failure." Sample trait anger items include "I have a fiery temper," "I get angry when I am slowed down by others mistakes." The respondents were asked to rate the extent to which the items reflect the way they generally feel on a four-point scale ranging from *almost never* (1) to *almost always* (4). Previous research has established the construct validity for the scales (Spielberger et al., 1970; Spielberger et al., 1985). In the present sample, Cronbach's alpha reliability was .80 for trait anxiety and .79 for trait anger. Trait Anxiety and Trait Anger correlated significantly with the total LOT-R score ($r = .44$, $p < .001$; $r = .22$, $p < .001$), and with the Optimism ($r = -.25$, $p < .001$; $r = -.09$, $p < .19$) and Pessimism ($r = .40$, $p < .001$; $r = .26$, $p < .001$) subscale scores, respectively.

Cardiovascular Measures—ABP was recorded via the Accutracker Dx ambulatory monitor (Suntech Medical Instruments Inc., Raleigh, NC). The BP cuff was placed on the participant's nondominant upper arm and positioned so that the microphone was over the inner aspect of the arm. The Accutracker Dx monitor uses the auscultatory method of BP assessment and is very similar in design to the Accutracker II, which has been validated according to the AAMI and BHS standards (Taylor, Chidley, Goodwin, Broeders, & Kirby, 1993). Further, BP values obtained using the Accutracker DX closely track those obtained by the Accutracker II and measures obtained during the clinic visits (Taylor et al., 1993). The data were uploaded to a PC via AccuWin software.

Individual ABP readings were deleted on a within-subject basis if systolic ABP > 250 mmHg, diastolic ABP > 150 or < 40, pulse pressure less than 10, HR < 30 bpm, or inconclusive readings because of the machine software. The readings of seven adolescents were deleted whose 24-hour or nighttime averages of systolic and/or diastolic ABP were above three standard deviations of the mean (none of the adolescents had averages below three standard deviations of the mean).

An average adolescent produced 27.6 (*SD* = 2.9) valid awake ABP readings out of the 24 to 33 possible readings depending on the reported bedtime the first day (from 8:30 a.m. until the reported bedtime; Mode = 10–11 p.m., Range = 8–8:30 p.m. to 1–1:30 a.m.), 10.7 (*SD* = 1.5) valid awake readings out of the 12 possible readings the second day (8:00 a.m. to 1:30 p.m.), and 6.8 (*SD* = 1.1) valid nighttime readings out of the 8 to 12 possible readings depending on the reported bedtime the intervening night (from the reported bedtime to 6 a.m.).

Total 24-hour ABP load was calculated as the percentage of each adolescent's ABP values for the consecutive 24 hours that exceeded the paediatric 95th percentile of systolic and diastolic BP specific for gender, age, and height (National High Blood Pressure Education Program Working Group on Hypertension Control in Children and Adolescents, 1996).

Electronic Diary of Physical and Mental Activity—Participants used a handheld computer (Palm Organizer) to record physical and mental states of potential relevance to BP. The computer has a real-time clock, synchronized to the Accutraker DX clock. Participants were instructed to complete their diary information within 10 minutes of BP cuff deflation for physical activity level (none, mild, moderate, heavy), posture (lying down, sitting, standing), location (school, home, work, car/bus, other), and whether the following had occurred: consumption of food, caffeine, or tobacco, and talking with school personnel, friends, parents, other relative, or some other person. Conflictual and pleasant interpersonal interactions, and calm/relaxed, angry/upset and involved/interested mood state were rated on a 6-point scale of "NO! No, no, yes, Yes, YES!" to indicate the intensity and occurrence of interpersonal event and mood state. Of the diary ratings of physical activity, posture, location, the conflictual and pleasant interactions, mood states (angry, involved, and calm), consumption, and talking with someone, on average 34.2 (*SD* = 5) ratings out of the maximum of 41 were valid, meaning that they were completed within 10 minutes of the expected time based on cuff inflation. The electronic diary was programmed to record physical and mental activity until bedtime the first day, but not later than 10 p.m. and from 8 a.m. till 1:30 p.m. the second day. Based on a principal components analysis with varimax rotation reported elsewhere (McGrath, Matthews, & Brady, 2006), the dairy ratings of anger, (low) calm, and conflict were added together to form a negative mood states/interventions component, and the ratings of involved/interested and pleasant interaction were summed to form a positive mood state/interactions component for each of the 41 daytime possible measurements. For convenience, we label these components hereafter as negative and positive mood. The alpha coefficients for the negative and positive mood factors across the monitoring period was .86 and .63, respectively.

Procedure

After participants were recruited and informed consent forms were signed, they were scheduled to participate in the ABP session and another session conducted at the University laboratory, during which resting BP levels, height, weight, demographic information, vascular stiffness, and vascular reactivity were measured. During the visit to the laboratory the participant filled in a number of psychological questionnaires, including the LOT-R, Spielberger trait anxiety inventory and trait anger scale, and measures of stressful circumstances and relationships (Brady & Matthews, 2006; Gallo & Matthews, 2006; Matthews, Salomon, Kenyon, & Zhou, 2005). On the first morning prior to the start of the school day, all participants were trained on how to use the ABP monitor and the handheld computer containing the electronic diary. They then wore the ambulatory monitor on 2 consecutive weekdays, during which BP was recorded every 30 minutes from 8:30 a.m. to 10 p.m., the first day, and 8:00 a.m. to 1:30 p.m. the second day, and every hour from 11 p.m. to 6 a.m. the intervening night. Each time the BP cuff deflated during the hours of awake, the participants noted in an electronic diary activity, posture, location, consumption of food, caffeine, or tobacco, with whom they were talking, and the intensity of mood states and conflictual and pleasant interpersonal interaction. At the end of each day, participants recorded their overall ratings of the day in terms of any physical symptoms and medications used, stress, the best thing and worst thing that happened to them, if anyone had provided help with a problem or argued with them, and if the monitoring day had represented a typical day in the ongoing daily life of the adolescent. There were no missing data.

Statistical Analyses

We used multilevel regression models (PROC MIXED, SAS Institute, 1997) to test the influence of high pessimism and low optimism on daytime and nighttime ABP levels and to test whether the covariation of within-person changes in daytime ABP and within-person changes in mood varied by total LOT-R and optimism and pessimism subscale scores. Significant interactions between optimism/pessimism scores and within-person mood were followed by tests of the slopes of ABP on mood separately for optimism and pessimism scores categorized into quartiles.

Analyses of daytime and nighttime ABP controlled for the time of day as a within-person covariate (modelled as a linear and quadratic terms because of the circadian pattern of ABP), and sex, ethnicity, and body mass index as between-person covariates. The analyses targeting the daytime ABP also included within-person covariates of mood, posture, activity, location, and food/caffeine/tobacco intake as indicated in the electronic diary. To control for negative affectivity in the analyses of daytime and nighttime ABP, further between-person adjustments were made for the optimism and pessimism components for the effects of each other, for trait anxiety, trait anger, and mood averaged across the monitoring day(s) (mood was not a within-person variable in this analysis). In the multilevel regression models, we specified the maximum likelihood estimation method, set up a variance components covariance matrix, a first-order autoregression error structure, and invoked the between-within denominator degrees of freedom method.

The study hypothesis that high pessimism and low optimism would be associated with higher 24-hour ABP load was tested by multiple linear regression analyses and controlling for the effects of all the between-person covariates listed above and mood components averaged across the first monitoring day.

To test for *curvilinear* relationships, that is, the second study objective, multilevel and multiple linear regression analyses were conducted with curvilinear effects modelled as quadratic terms of optimism/pessimism scores and entered into regression equation simultaneous to linear terms. Helmert contrasts in univariate analyses of variance (ANOVA) were computed as tests of *threshold* relationships. In ANOVA, total LOT-R and optimism and pessimism subscale scores were categorized into quartiles and used as grouping variables, and the average of the ABP measurements during the school days, night, and 24-hour ABP load served as dependent variables.

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RESULTS

Sample Characteristics

Table 2 shows the average ABP levels and 24-hour loads, and the other study variables according to ethnicity and gender. African American, relative to White adolescents, exhibited higher average diastolic ABP levels during the daytime and a higher 24-hour diastolic ABP load. Boys, relative to girls, exhibited higher average systolic ABP levels across the daytime and nighttime and a higher 24-hour systolic ABP load. Moreover, African American relative to White families reported fewer years of parental education; boys relative to girls were heavier and taller. There were no significant ethnicity or gender differences in total LOT-R, or in optimism and pessimism subscale scores. More pessimistic adolescents had parents with fewer years of education (pessimism subscale, $r = -.14$, $p < .05$).

Associations of Optimism and Pessimism With Ambulatory Blood Pressure

Table 3 shows the multilevel and multiple linear regression analyses results relevant to testing the hypothesis that high pessimism and low optimism predict higher average levels of ABP during the day and night and higher 24-hour ABP load. Results showed that only the pessimism subscale scores were related to ABP. For each one standard deviation (1 *SD*) increase in pessimism subscale (pessimism scores standardized by sex), systolic ABP level across daytime and nighttime increased by 1.86 mmHg and 2.58 mmHg, respectively, and 24-hour systolic ABP load increased by 3.54%. For each 1 *SD* increase in pessimism subscale, diastolic ABP level across daytime increased by 1.28 mmHg, and 24-hour diastolic ABP load by 2.73%. None of the significant associations for pessimism subscale scores with ABP became nonsignificant when controlling for gender, ethnicity, and body mass index (Table 3) or for the effects of the optimism subscale, trait anxiety, trait anger, or negative and positive mood states averaged across the monitoring day(s) (ps < .05; data not shown). The analyses targeting the daytime ABP readings were not altered when controlling for within-person fluctuations in negative and positive mood and other daily activities (Table 4).

We next tested whether the effects of total LOT-R or optimism and pessimism subscale scores with ABP were curvilinear or best depicted by a threshold effect. Multilevel and multiple linear regression analyses revealed no significant curvilinear effects (tested simultaneously with linear effects) of pessimism subscale scores on ABP (ps > .29; data not shown). Helmert contrasts of ANOVA showed evidence for threshold effects for systolic ABP: Adolescents scoring on the lowest quartile of the distribution of pessimism scores showed the lowest systolic ABP levels for both day and night periods and the full 24-hour loads (Figure 1), while adolescents in the other three quartiles were similar and not differing significantly from each other (ps > .40), and had greater levels and loads of systolic ABP. (Note that the two middle quartiles were combined because of uneven-sized groups, n = 68, 31, 49 and 53 for the quartiles from the lowest to the highest, respectively.) While the Helmert contrasts provided statistical support for threshold effects for diastolic ABP, the linear effect was also strong (Figure 2). Total LOT-R (ps > .06; data not shown), and optimism subscale scores (ps > .12; data not shown) showed no significant curvilinear (tested simultaneous to linear effects) or threshold relationships with ABP.

Finally, we tested whether ABP responses to within-person changes in intensity of negative and positive mood varied by total LOT-R, and optimism and pessimism subscale scores. Two significant interactions out of a possible six occurred: optimism subscale by within-person intensity of negative (estimate = −0.16, $t = -2.09$, $p < .04$) and positive mood (estimate = 0.23, $t = 2.25$, $p < .02$) in the analyses of systolic ABP. At times of more intense negative mood, systolic ABP of the least optimistic adolescents (lowest quartile) increased by 0.47 mmHg ($t = 2.94$, $p < .003$), whereas systolic ABP was not affected for those scoring higher on the optimism subscale (*p*s > .43). However, at times of more intense positive mood, systolic ABP for the most optimistic adolescents increased by 0.41 mmHg ($t = 1.68$, $p = .09$), whereas systolic ABP was not affected for those scoring lower on the optimism subscale (*p*s > .58)

Other Relevant Data

We examined whether optimistic and pessimistic adolescents differed on the monitoring day in their reports of physical symptoms and medications used, distress, the best thing and the worst thing that happened, and if the monitoring day had represented a typical day. The more pessimistic adolescents reported more frequently unusual physical symptoms (total LOT-R, $r = .17$, $p < .02$; pessimism subscale, $r = .16$. $p < .03$), and less pleasure in the best thing that had happened to them on the monitoring day (total LOT-R, $r = -.16$, $p < .03$), while the more optimistic adolescents reported experiencing less distress in the worst thing that had happened to them on the monitoring day (optimism subscale, $r = -.15$. $p < .04$). Optimistic and pessimistic adolescents did not differ in their reports of how typical the monitoring day was or in any other ratings of the monitoring day (*p*s > .10; data not shown); they also did not report any differences in intensity of negative and positive mood across the daytime measurements at the time ABP assessments (*p*s > .31).

DISCUSSION

This study was conducted to fill in an important gap in our understanding of the optimistic and pessimistic expectancies as predictors of an important psychophysiological outcome during adolescence. We found that adolescents who scored higher on the pessimism subscale of the LOT-R exhibited higher daytime and/or nighttime systolic and diastolic ABP levels and higher 24-hour systolic and diastolic ABP loads. The optimism subscale of the LOT-R, and the total LOT-R score were unrelated to overall ABP. These associations did not change when gender, ethnicity, body mass index, daily activities, intensity of interpersonal interactions, and mood states were statistically controlled. Trait anxiety did not attenuate the association of pessimism and ABP. These findings, thus, confirm the study hypothesis with regard to the role of pessimism and physical health and are consistent with the results of studies by Schulz, Bookwala, Knapp, Scheier, and Williamson (1996) and Milam et al. (2004) that emphasize the importance of pessimism in predicting mortality and worsening health in cancer and HIV patients, respectively.

The secondary objective was to test whether the associations between optimism, pessimism, and ABP were linear, curvilinear, or showed evidence of threshold relationships. In agreement with our earlier findings regarding carotid intima-medial thickness as the health outcome (Matthews et al., 2004), we found that the associations of systolic ABP showed evidence of a threshold relationship. Adolescents who had scores in the lowest quartile on the distribution-of-pessimism subscale scores had the lowest systolic ABP levels across the 2 days and intervening night, and lowest systolic 24-hour systolic ABP loads. Adolescents with scores in the upper three quartiles on the pessimism subscale had similar and significantly higher ABP levels and loads. This suggests that not only the highest levels of pessimism but also moderate levels of pessimism may have important implications for psychophysiological responses to daily living.

The associations of pessimism and nighttime systolic ABP and systolic and diastolic 24-hour loads are noteworthy. Nighttime systolic ABP has unique predictive value in determining risk of future hypertension and complications from hypertension (Staessen et al., 2001). In a similar vein 24-hour ABP load is associated with target end-organ damage in mildly hypertensive (Belsha et al., 1998) and untreated hypertensive children (Sorof et al., 2002). Some evidence suggests that chronic stress is related to elevated nighttime pressure, for example, work stress for middle-aged adults and violence exposure for adolescents (Kario, James, Marion, Ahmed, & Pickering, 2002; Wilson, Kliewer, Teasley, Plybon, & Sica, 2002). Pessimistic attitudes may have a physiologic cost on adolescents' nighttime BP, even when they are presumably sleeping, and on the toll on the cardiovascular system over a 24-hour period.

The null findings regarding the relationships between the optimism scale and ABP deserve explicit comment because they are in contrast to our prior significant findings in healthy adults (Räikkönen et al., 1999). A number of possible explanations may be offered. The first is related to the characteristics of the two samples. The current sample was composed of Black and White adolescents, who may be confronted by frequent distressing events in their ongoing daily living (Arnett, 1999), while the sample of our earlier study was composed of healthy, employed, mainly Caucasian middle-aged persons who had no obvious life-altering events. It may be that pessimism is a more powerful predictor at times of change than of stability.

Second, and perhaps more important, are the psychometric qualities of the LOT-R and subscales in adolescents versus adults. We obtained lower reliability coefficients for total LOT-R and subscales in the current sample than obtained in our prior work in adults. In other samples of adolescents, the internal reliability of the total LOT-R also tends to be low ($\alpha = 0.73$, Chang & Sanna, 2003; $\alpha = 0.57$, Roberts et al., 1998), raising the issue of how valid the total LOT-R and subscales are in adolescents. Supporting the validity of the total LOT-R scale in adolescents are the results showing that more pessimistic adolescents on the total LOT-R report less positive affect and more negative affect, depression, hopelessness, recent hassles, dental anxiety, suicidal ideation, frequent substance abuse, and lower life satisfaction (Ben-Zur, 2003; Carvajal et al., 1998; Chang & Sanna, 2003; Neverlien & Backer Johnsen, 1991; Roberts et al., 1998). However, these studies do not report findings for the subscales. Further, in our study, the shared variance between the optimism and pessimism components was 7.3%, in contrast to that found between the two components, that is, 22.1%, in our earlier study of adults (Räikkönen et al., 1999). This could suggest greater independence of positive and negative expectations in adolescence than in adulthood or it may again raise issues about the adequacy of the items for adolescents. We have more concern about the optimism items because of their lower reliability and the null association with ABP across 2 days of monitoring, although lower optimism subscale was associated as predicted with greater ABP at the times of negative mood and higher optimism subscale with greater ABP at times of positive mood. Thus, we are not in position to conclude that optimistic attitudes are unassociated with ABP in adolescents. It is important to investigate in future work the reliability and validity of the LOT-R and subscales in adolescence and to replicate the relationships with ABP in future studies.

To the extent that our findings regarding pessimistic attitudes are valid, why might pessimism influence psychophysiological responses? Pessimists may fare worse because they may have habits that compromise health, or pessimism may reduce the motivation to alter health behaviors. Indeed, it has been shown that on the optimism-pessimism continuum, pessimists report fewer health-promoting behaviors than do optimists (see, e.g., Scheier & Carver, 1992). A recent study in African American 8- to 10-year-old girls showed that pessimism (measured via another measures of optimism-pessimism, the Youth Life Orientation Test) was correlated with a sedentary lifestyle, and pessimists benefited less from a 12-week physical activity and dietary intervention than did optimists (Taylor et al., 2004). Furthermore, pessimists may be overall less resilient, that is, in addition to higher ABP level, pessimistic adolescents reported in our study experiencing more unusual physical symptoms (cf. Schulz et al., 1996; Milam et al., 2004) and feeling less positively in response to the best thing that happened that day. Pessimists also report lower levels of social support (e.g., Brissette, Scheier, & Carver, 2002). Trait positive affect and social support may be, in turn, associated with better physical health (see, e.g., Pressman & Cohen, 2005). One further possibility is that pessimists may fare worse because they engage in avoidant, less effective coping, disengaging from situations and giving up (Brissette et al., 2002; Scheier, Weintraub, & Carver, 1986). While it may provide relief in the short run, the less effective coping strategies may in the long run lead to chronic load and a state of ongoing psychophysiological arousal. Physiological, sympathetic, and vascular reactivit and hormonal mechanisms, particularly the hypothalamic-pituitary-adrenal axis, may be involved as well.

Our study has several limitations. We cannot draw causal inferences from the associations. The rather low reliability of the LOT scores, especially the optimism subscale scores, raises questions about the validity of the scale. However, the lower reliability may reflect the life stage of the sample, that is, when future orientation is less salient to adolescents. We also cannot rule out that some unknown momentary factor might have influenced the adolescents' responses to the LOT-R and affected its reliability. Consistent with this observation is the suggestion that personality traits may show meaningful changes in response to everyday experiences (see Tennen, Affleck, & Armeli, 2005). The sample was comprised of healthy adolescents. Thus, the modest magnitude of associations ought to be considered when evaluating the clinical significance of the findings. Our diary data were limited by constraints of school attendance, and we did not have detailed measures of mood, for example, sadness, or interpersonal interactions. We do not have data available on defensive pessimism (e.g., Showers, 1992), self-efficacy (Bandura, 1977) or hope (Snyder, 1994), concepts that bear theoretical and empirical resemblance with dispositional optimism and pessimism. Thus, we cannot disentangle the different measures of positive and negative expectancies and their significance for ABP.

In sum, our study found that pessimistic adolescents had higher systolic and diastolic ABP levels during 2 consecutive school days and an intervening night, and greater 24-hour systolic and diastolic ABP loads, BP indices that have important implications for future cardiovascular health (e.g., Belsha et al., 1998; Sorof et al., 2002). The associations with systolic ABP were best depicted by threshold relationships, such that adolescents with scores in the lowest, compared to the upper three quartiles, on pessimism subscale of the LOT-R exhibited the lowest systolic ABP levels and 24-hour loads. While low optimism subscale scores were not associated with ABP level and 24-hour load at times when the least optimistic adolescents felt more intense negative moods, their systolic ABP was elevated. These results suggest that optimism and pessimism are not the opposite poles on a single continuum but ought to be treated as separate constructs. They also suggest that focusing on pessimistic attitudes in adolescents may be important for preventing future hypertension manifesting clinically only decades later.

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REFERENCES

Arnett JJ. Adolescent storm and stress, reconsidered. American Psychologist 1999;54:317–326. [PubMed: 10354802]

Bandura A. Self efficacy: Toward a unifying theory of behavioural change. Psychological Review 1977;84:191–215. [PubMed: 847061]

Belsha CW, Wells TG, McNiece KL, Seib PM, Plummer JK, Berry PL. Influence of diurnal blood pressure variations on target organ abnormalities in adolescents with mild essential hypertension. American Journal of Hypertension 1998;11:410–417. [PubMed: 9607378]

Ben-Zur H. Happy adolescents: The link between subjective well-being, internal resources, and parental factors. Journal of Youth and Adolescence 2003;32:67–69.

Brady S, Matthews KA. Chronic stress influences ambulatory blood pressure in adolescents. Annals of Behavioral Medicine 2006;31:80–88. [PubMed: 16472042]

Brissette I, Scheier MF, Carver CS. The role of optimism in social network development, coping, and psychological adjustment during a life transition. Journal of Personality and Social Psychology 2002;82:102–111. [PubMed: 11811628]

Cacioppo, JT.; Tassinary, LG. Psychophysiology and psychophysiological inference. In: Cacioppo, JT.; Tassinary, LG., editors. Principles of psychophysiology. Cambridge: Cambridge University Press; 1990. p. 3-33.

Carvajal SC, Clair SD, Nash SG, Evans RI. Relating optimism, hope, and self-esteem to social influences in deterring substance use in adolescents. Journal of Social and Clinical Psychology 1998;17:443–465.

Chang CE, Sanna LJ. Experience of life hassles and psychological adjustment among adolescents: Does it make difference if one is optimistic or pessimistic? Personality and Individual Differences 2003;34:687–879.

Funetes RM, Notkola IL, Shemeikka S, Tuomilahto J, Nissinen A. Tracking of systolic blood pressure during childhood: A 15-year follow-up population-based family study in eastern Finland. Journal of Hypertension 2002;20:195–202. [PubMed: 11821703]

Gallo LC, Matthews KA. Adolescents' attachment orientation influences ambulatory blood pressure response to everyday social interactions. Psychosomatic Medicine 2006;68:253–261. [PubMed: 16554391]

Kario KJ, James GD, Marion R, Ahmed M, Pickering T. The influence of work- and home-related stress on the levels of diurnal variation of ambulatory blood pressure and neurohormonal factors in middle-aged women. Hypertension Research—Clinical & Experimental 2002;25:499–506.

Kubzansky LD, Kubzansky PE, Maselko J. Optimism and pessimism in the context of health: Bipolar opposites or separate constructs? Personality and Social Psychology Bulletin 2004;30:943–956. [PubMed: 15257780]

Lai J. Differential predictive power of the positively versus negatively worded items of the Life Orientation Test. Psychological Reports 1994;75:1507–1515. [PubMed: 7886172]

Li S, Chen W, Srinivasan SR, Bond MG, Tang R, Urbina EM, Berenson GS. Childhood cardiovascular risk factors and carotid vascular changes in adulthood: The Bogalusa Heart Study. Journal of the American Medical Association 2003;290:2271–2276. [PubMed: 14600185]

Marshall GN, Wortman CB, Kusulas JW, Hervig LK, Vickers RRJ. Distinguishing optimism from pessimism: Relations to fundamental dimensions of mood and personality. Journal of Personality and Social Psychology 1992;62:1067–1074.

Matthews KA, Räikkönen K, Sutton-Tyrrell K, Kuller LH. Optimistic attitudes protect against progression of carotid atherosclerosis in healthy middle-aged women. Psychosomatic Medicine 2004;66:640–644. [PubMed: 15385685]

Matthews KA, Salomon K, Kenyon K, Zhou F. Unfair treatment, discrimination, and ambulatory blood pressure in black and white adolescents. Health Psychology 2005;24:258–265. [PubMed: 15898861]

McGrath JJ, Matthews KA, Brady SS. Individual versus neighborhood socioeconomic status and race as predictors of adolescent ambulatory blood pressure and heart rate. Social Science and Medicine 2006;63:1442–1453. [PubMed: 16733078]

Milam JE, Richardson JL, Marks G, Kemper CA, McCutchan AJ. The roles of dispositional optimism and pessimism in HIV disease progression. Psychology and Health 2004;19:167–181.

Mroczeck DK, Spiro A III, Aldwin CM, Ozer DJ, Bosse' R. Construct validation of optimism and pessimism in men: Findings from the Normative Aging Study. Health Psychology 1993;12:406–409. [PubMed: 8223365]

National High Blood Pressure Education Program Working Group on Hypertension Control in Children and Adolescents. Update on the 1987 task force report on high blood pressure in children and adolescents: A working group report from the National High Blood Pressure Education Program. Pediatrics 1996;98(4):649–658. [PubMed: 8885941]

Neverlien PO, Backer Johnsen T. Optimism-pessimism dimension and dental anxiety in children aged 10–12 years. Community Dentistry & Oral Epidemiology 1991;19:342–346. [PubMed: 1764901]

O'Sullivan JJ, Derrick G, Foxall RJ. Tracking of 24-hour and casual blood pressure: a 1-year follow-up study in adolescents. Journal of Hypertension 2000;18:1193–1196. [PubMed: 10994749]

Pickering TG, Shimbo D, Haas D. Ambulatory blood-pressure monitoring. New England Journal of Medicine 2006;354:2368–2374. [PubMed: 16738273]

Pressman SD, Cohen S. Does positive affect influence health? Psychological Bulletin 2005;131:925–971. [PubMed: 16351329]

Räikkönen K, Matthews KA, Flory JD, Owens JF, Gump BB. Effects of optimism, pessimism and trait anxiety on ambulatory blood pressure and mood during everyday life. Journal of Personality and Social Psychology 1999;76:104–113. [PubMed: 9972556]

Raitakari OT, Juonala M, Kähkönen M, Taittonen L, Laitinen T, Mäki-Torkko N, et al. Cardiovascular risk factors in childhood and carotid artery intima-media thickness in adulthood: The Cardiovascular Risk in Young Finns Study. Journal of the American Medical Association 2003;290:2320–2322. [PubMed: 14600192]

Raykov T, Shrout P. Reliability scales with general structure. Point and interval estimation using a structural equation modelling approach. Structural Equation Modelling 2002;9:195–212.

Roberts RE, Roberts CR, Chen YR. Suicidal thinking among adolescents with a history of attempted suicide. Journal of the American Academy of Child and Adolescent Psychiatry 1998;37:1294–1300. [PubMed: 9847502]

Robinson-Whelen S, Kim C, MacCallum RC, Kiecolt-Glaser JK. Distinguishing optimism from pessimism in older adults: Is it more important to be optimistic or not to be pessimistic? Journal of Personality and Social Psychology 1997;73:1345–1353. [PubMed: 9418282]

SAS Institute. SAS/STAT7. Software changes and enhancements through release 6.12. Cary, NC: SAS Institute Inc.; 1997. [computer program]

Scheier MF, Carver CS. Optimism, coping, and health: Assessment and implications of generalized outcome expectancies. Health Psychology 1985;4:219–247. [PubMed: 4029106]

Scheier MF, Carver CS. Effects of optimism on psychological and physical well-being: Theoretical overview and empirical update. Cognitive Therapy and Research 1992;16:201–228.

Scheier, MF.; Carver, CS. Goals and confidence as self-regulatory elements underlying health and illness behavior. In: Cameron, LD.; Leventhal, H., editors. The self-regulatory of health and illness behavior. Reading, UK: Harwood; 2003a. p. 17-41.

Scheier, MF.; Carver, CS. Self-regulatory processes and responses to health threats: Effects of optimism on well-being. In: Suls, J.; Wallston, K., editors. Social psychological foundations of health. Oxford, UK: Blackwell; 2003b. p. 395-428.

Scheier MF, Carver CS, Bridges MW. Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the Life Orientation Test. Journal of Personality and Social Psychology 1994;67:1063–1078. [PubMed: 7815302]

Scheier, MF.; Carver, CS.; Bridges, MW. Optimism, pessimism, and psychological well-being. In: Chang, EC., editor. Optimism & pessimism: Implications for theory, research, and practice. Washington, DC: American Psychological Association; 2001. p. 189-216.

Scheier MF, Weintraub JK, Carver CS. Coping with stress: Divergent strategies of optimists and pessimists. Journal of Personality and Social Psychology 1986;51:1257–1264. [PubMed: 3806361]

Schulz R, Bookwala J, Knapp JE, Scheier M, Williamson GM. Pessimism, age, and cancer mortality. Psychology and Aging 1996;11:304–309. [PubMed: 8795058]

Showers C. The motivational and emotional consequences of considering positive or negative possibilities for an upcoming event. Journal of Personality and Social Psychology 1992;63:474–484. [PubMed: 1403626]

Smith TW, Pope MK, Rhodewalt F, Poulton JL. Optimism, neuroticism, coping, and symptom reports: An alternative interpretation of the Life Orientation Test. Journal of Personality and Social Psychology 1989;56:640–648. [PubMed: 2709311]

Snyder, CR. The psychology of hope: You can get there from here. New York: Free Press; 1994.

Sorof JM, Cardwell G, Franco K, Portman RJ. Ambulatory blood pressure and left ventricular mass index in hypertensive children. Hypertension 2002;39(4):903–908. [PubMed: 11967247]

Spielberger, CD.; Gorsuch, RL.; Lushene, RE. Manual for the State-Trait Anxiety Scale. Palo Alto, CA: Consulting Psychologist Press; 1970.

Spielberger, CD.; Johnson, EH.; Russell, SF.; Crane, RJ.; Jacobs, GA.; Worden, TJ. The experience and expression of anger. In: Chesney, MA.; Goldston, SE.; Rosenman, RH., editors. Anger and hostility in behavioral medicine. New York: McGraw-Hill; 1985. p. 5-30.

Staessen JA, Asmar R, De Buyzere M, Imai Y, Parati G, Shimada K, et al. Task Force II: Blood pressure measurement and cardiovascular outcomes. Blood Pressure Monitoring 2001;6:355–370. [PubMed: 12055415]

Staessen JA, Thijs L, Fagard R, O'Brien ET, Clement D, de Leeuw PW, et al. Predicting cardiovascular risk using conventional vs. ambulatory blood pressure in older patients with systolic hypertension. Systolic Hypertension in Europe Trial Investigators. Journal of the American Medical Association 1999;282(6):539–546. [PubMed: 10450715]

Tarkkonen L, Vehkalahti K. Measurement errors in multivariate measurement scales. Journal of Multivariate Analysis 2005;96:172–189.

Taylor R, Chidley K, Goodwin J, Broeders M, Kirby B. Accutracker II (Version 30/23) Ambulatory blood pressure monitor: Clinical validation using the British Hypertension Society and the Association for the Advancement of Medical Instrumentation standards. Journal of Hypertension 1993;11:1275–1282. [PubMed: 8301110]

Taylor WC, Baranowski T, Klesges LM, Ey S, Pratt C, Rochon J, et al. Psychometric properties of optimism and pessimism: results from the Girls' Health Enrichment Multisite Studies. Preventive Medicine 2004;38:s69–s77. [PubMed: 15072861]

Tennen H, Affleck G, Armeli S. Personality and daily experience revisited. Journal of Personality 2005;73:1465–1484. [PubMed: 16274442]

Vos LE, Oren A, Uiterwaal C, Gorissen WHM, Grobbee DE, Bots ML. Adolescent blood pressure and blood pressure tracking into young adulthood are related to subclinical atherosclerosis: The Atherosclerosis Risk in Young (ARYA) Study. American Journal of Hypertension 2003;16:549–555. [PubMed: 12850388]

Wilson DK, Kliewer W, Teasley M, Plybon L, Sica DA. Violence exposure, catecholamine excretion, and blood pressure nondipping status in African American male versus female adolescents. Psychosomatic Medicine 2002;64:906–915. [PubMed: 12461196]

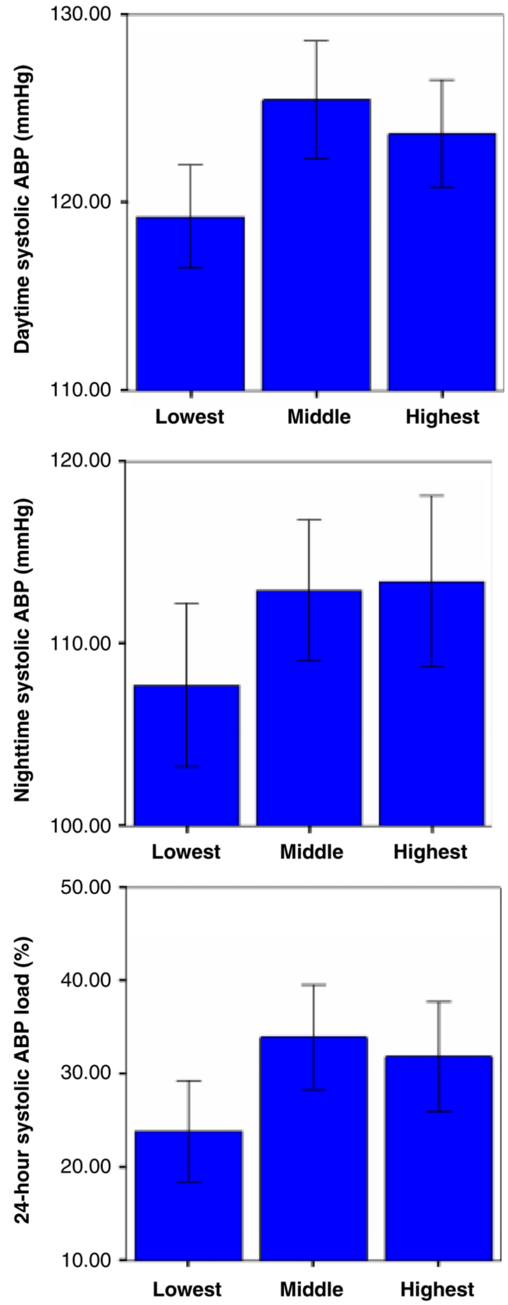

Figure 1.

Relationships between LOT-R pessimism subscale score (lowest, two middle and the highest quartiles) and daytime and nighttime systolic ambulatory blood pressure (ABP) during 2 school days and 24-hour systolic ABP load. Data are means and 95 percent confidence intervals. *p*-values for linear and Helmert tests were as follows: For daytime systolic ABP, $p = .05$ and .004, for nighttime systolic ABP, $p = .08$, and .04, and for 24-hour systolic ABP load, $p = .06$ and .01, respectively.

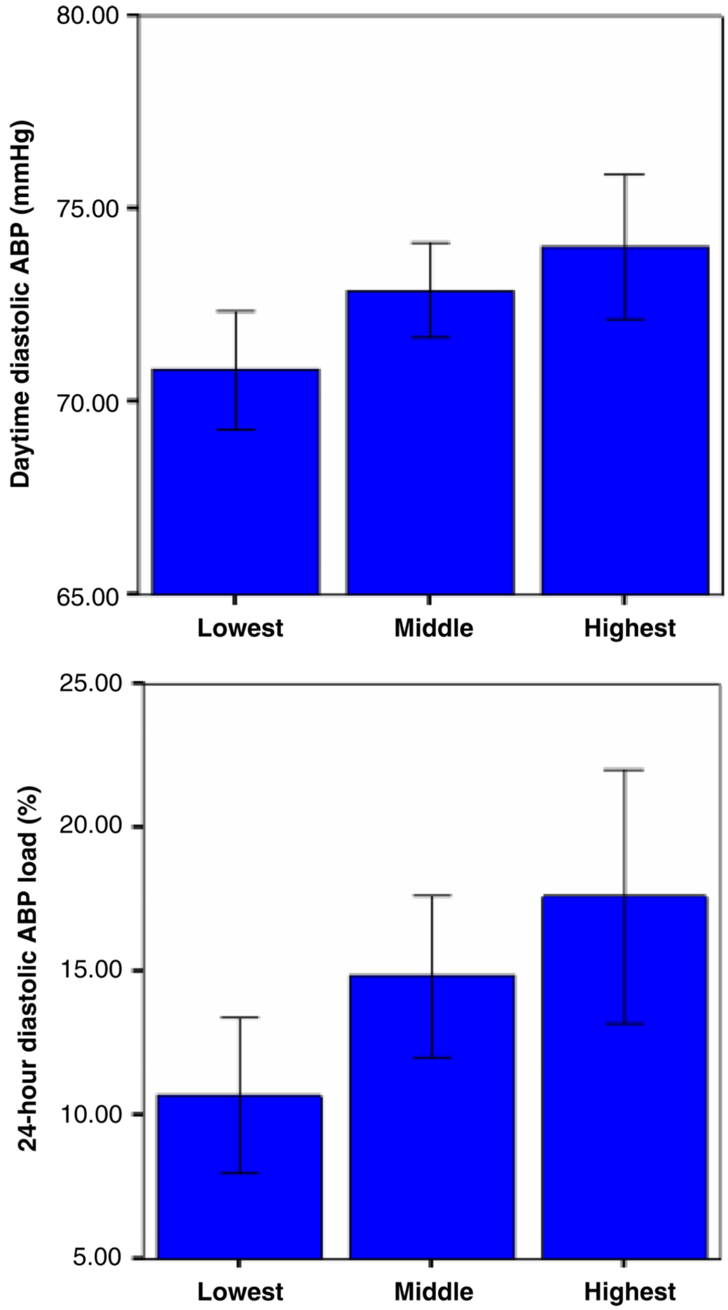

Figure 2.
Relationships between LOT-R pessimism subscale score (lowest, two middle and the highest quartiles) and daytime diastolic ambulatory blood pressure (ABP) during 2 school days and 24-hour diastolic ABP load. Data are means and 95 percent confidence intervals. *p*-values for linear and Helmert tests were as follows: For daytime diastolic ABP, $p = .006$ and .005, and for 24-hour diastolic ABP load, $p = .004$ and .005, respectively.

Table 1

Confirmatory Factor Analysis of the LOT-R

	Two-Factor Solution				One-Factor Solution	
Item	**Std. Loading**	***t***	**Std. Loading**	***t***	**Std. Loading**	***t***
I hardly ever expect things to go my way.	.78	8.88			.71	8.99
If something can go wrong for me, it will.	.54	6.76			.55	7.02
I rarely count on good things happening to me.	.49	6.15			.47	5.96
I am always optimistic about my future.			.36	3.96	−.23	−2.86
In uncertain times I usually expect the best.			.13	1.36	−.07	−0.83
Overall, I expect good things happen to me than bad.			.65	8.29	−.59	−8.21

Note: $\chi 2(8) = 9.031$, $p < .3397$, CFI = .992, RMSEA = .025 for the two-factor solution; $\chi 2(9) = 21.052$, $p < .01244$, CFI = .910, RMSEA = .079 for the one-factor solution; The models specified one correlated error between the items “ I am always optimistic about my future” and “ In uncertain times I usually expect the best”; Std. loading refers to standardized factor loading.

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Table 2

Characteristics of the Sample

Characteristic	Ethnicity: White *M* (*SD*)	Ethnicity: African American *M* (*SD*)	Gender: Boys *M* (*SD*)	Gender: Girls *M* (*SD*)	*p* Ethnicity	*p* Gender
Systolic ABP across:						
Daytime (mmHg)	122.8 (13.9)	122.9 (10.8)	126.1 (11.8)	119.7 (12.3)	.95	.0001
Nighttime (mmHg)	110.5 (18.8)	112.1 (16.2)	114.6 (17.3)	107.9 (17.2)	.52	.01
24-hour Load (%)	28.4 (25.1)	31.5 (22.3)	33.9 (23.0)	26.0 (23.9)	.35	.02
Diastolic ABP across:						
Daytime (mmHg)	71.4 (6.2)	73.5 (6.3)	72.9 (6.2)	72.0 (6.4)	.02	.29
Nighttime (mmHg)	60.1 (6.7)	61.7 (0.1)	61.8 (9.9)	60.0 (6.8)	.20	.15
24-hour Load (%)	11.2 (11.6)	17.2 (14.4)	14.9 (13.8)	13.4 (13.0)	.001	.40
Height (cm)	165.9 (8.6)	164.8 (8.5)	169.6 (7.9)	161.1 (7.0)	.40	.0001
Weight (kg)	62.1 (12.8)	63.5 (13.9)	64.8 (14.5)	60.7 (11.8)	.48	.03
Body Mass Index (kg/m^2)	22.5 (3.8)	23.2 (4.1)	22.4 (3.8)	23.4 (4.1)	.19	.08
Waist circumference(cm)	72.7 (10.8)	72.7 (9.7)	73.2 (10.8)	71.2 (9.6)	.46	.16
Age (yrs)	14.6 (.7)	14.5 (.6)	14.6 (.6)	14.6 (.6)	.42	.86
Parental education (yrs)	14.9 (2.7)	13.4 (1.5)	14.0 (2.3)	14.2 (2.4)	.0001	.56
Dispositional optimism						
Total LOT-R*	9.2 (3.5)	8.9 (3.4)	9.1 (3.9)	8.9 (3.1)	.47	.68
Optimism subscale	7.6 (1.9)	8.1 (2.1)	7.9 (2.1)	7.7 (2.0)	.08	.60
Pessimism subscale	4.8 (2.3)	4.9 (2.5)	5.0 (2.6)	4.7 (2.2)	.67	.30

Note: Degrees of freedom for the test statistics are 1,199.

* Total LOT-R is scored in the pessimism direction.

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Table 3

Associations Between Dispositional Optimism, Pessimism, and Ambulatory Blood Pressure (ABP)

	Total LOT-R			Optimism Subscale			Pessimism Subscale		
	B*	***p***	***p*adjusted**	**B***	***p***	***p*adjusted**	**B***	***p***	***p*adjusted**
Systolic ABP across:									
Daytime (mmHg)	0.84	.34	.29	.0.94	.29	.19	1.86	.04	.03
Nighttime (mmHg)	1.90	.12	.10	0.06	.96	.97	2.58	.04	.03
24-hour Load (%)	1.40	.43	.40	2.23	.13	.18	3.54	.02	.03
Diastolic ABP across:									
Daytime (mmHg)	0.69	.13	.16	0.53	.23	.17	1.28	.004	.006
Nighttime (mmHg)	−0.05	.92	.77	0.76	.21	.13	0.36	.47	.53
24-hour Load (%)	1.26	.28	.33	1.51	.14	.14	2.73	.02	.03

Note: B refers to parameter estimate in multilevel regression models (daytime and nighttime ABP) and to unstandardized regression coefficient in multiple linear regression models (24-hour load); optimism and pessimism scores were standardized by sex for the analyses. Thus, the estimates/coefficients reflect a unit change in blood pressure per each one standard deviation change in optimism and pessimism scores; multilevel models included time of day as a within-person covariate; *p*adjusted refers to analyses adjusting for gender, ethnicity, and body mass index; degrees of freedom are 1,199 (unadjusted) and 4,196 (adjusted) for test statistics in multilevel and multiple linear regression analyses.

Table 4

Parameter Estimates for Multilevel Models Reflecting Change in Ambulatory Blood Pressure (ABP) During Daytime According to Dispositional Pessimism

	Systolic ABP		Diastolic ABP	
	Estimate*	***p***	**Estimate***	***p***
Location (vs. school):				
Home	3.14	<.001	−2.61	<.001
Other	3.75	<.001	1.06	<.04
Position (vs. reclining):				
Sitting	1.63	.06	4.73	<.001
Standing	8.22	<.001	9.87	<.001
Physical activity (vs. none):				
Mild	2.91	<.001	1.11	<.001
Moderate or greater	5.83	<.001	1.50	<.001
Intake of food, caffeine, tobacco	1.79	<.001	1.29	<.001
Mood factors:				
Negative	0.16	.04	0.15	.007
Positive	0.07	.49	0.17	.01
*Dispositional pessimism**	2.15	.01	1.23	.005

*Pessimism scores were standardized by sex for the analyses, thus the estimates reflect a unit change in blood pressure per each one standard deviation change in pessimism scores. The models also included sex, ethnicity and body mass index as between-person covariates. Degrees of freedom are 4,196 for the test statistics regarding dispositional pessimism.