Outlook on relations: Personal networks and psychosocial characteristics of visually impaired adolescents
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Introduction

This chapter concerns the meaning of structural and functional network aspects for blind and visually impaired adolescents. In the first section of this chapter, general information about using models and structural equation modeling (SEM) is presented (7.1). Several SEM results of this study are presented in the next three sections. In section 7.2 three kinds of confirmatory factor analysis are presented. Firstly, SEM results for the network aspects are described (7.2.1) followed by factor results for adjustment (7.2.2). Thirdly, findings of the SEM factor analysis for well-being (7.2.3) are presented. Correlational results for associations between network aspects on the one hand, and indicators for adjustment and well-being on the other hand, are expounded in section 7.3. In the theoretical framework as shown in figure 7.1, this is depicted as the arrow between the network aspects and psychosocial characteristics and well-being. These correlation results function as an introduction to the SEM results concerning the meaning of network aspects.
The results of Structural Equation Modeling for the relations between all the factors for blind and visually impaired adolescents are presented in 7.4.1. The direct and indirect effect of background characteristics—like sex, age and degree of the impairment—are presented in 7.4.2. The comparison of our results with those of the two reference projects is described in 7.4.3. With these results—especially in section 7.4—we can answer research questions c.1, c.2 and c.3.

c.1 What is the association between on the one hand aspects of the personal network and on the other hand psychosocial characteristics, well-being and loneliness of blind and visually impaired adolescents?

c.2 What are the direct and indirect effects of several background characteristics of participants on the explanatory model of the associations between variables (see question c.1)?

c.3 In what way do blind and visually impaired adolescents differ from sighted adolescents with respect to these associations?

Finally, in section 7.5 a summary of this chapter is presented.
7.1 What is Structural Equation Modeling?

Why did we use a structural equation model in our research? As described in section 2.5, identifying an explanatory model for the associations between several concepts for a specific sample, provides more insight into processes in the real world. An advantage of using models is the possibility of including many variables and associations between them, just as human behavior in reality is influenced by many factors. Other kinds of analyses can not include that much variables and associations between variables at once. The model specification is mostly guided by a combination of theory and empirical results from previous research. Popular software products in social science for Structural Equation Modeling are LISREL and AMOS. We used AMOS (Version 3.6) (Arbuckle, 1997).

The purpose of Structural Equation Modeling (SEM) is twofold. First, it aims at obtaining estimates of the parameters of the model. Parameters are relations, or paths, between (blocks of) variables. The second purpose is to assess the fit of the model, i.e. to assess whether the model itself provides a good fit to the data (Hox, 1998). Usually, a SEM analysis is started by drawing a path diagram, based on for example figure 7.1. A path diagram consists of, firstly, observed or measured variables: which are drawn as boxes. Secondly the model contains latent, unmeasured variables: drawn as circles. For each latent variable or factor, one loading must be fixed to one, needed to give the latent factor an interpretable scale (Hox & Bechger, 1998). Each measured and each latent variable is associated with a residual error term, which is also unmeasured and depicted by a circle. The boxes and circles are connected by arrows. Single headed arrows or paths are used to define causal relationships in the model. Double headed arrows, for example between error terms, indicate correlations without a causal interpretation.

The estimates of parameters, usually based on Maximum Likelihood estimation, are accompanied by a chi-square, which provides information regarding how well the hypothesized model fits the data. If the chi-square is highly significant, the null-hypothesis - no discrepancy between model and data - is rejected. We are therefore striving towards a non-significant chi-square, meaning that the model fits the data.

With a very large sample, the statistical test will almost certainly be significant, and the model will be rejected, even if it actually describes the data well (Hox, 1988). Conversely, with a very small sample (N<100), the model will always be accepted, even if it fits rather badly. To solve this problem, researchers have proposed a variety of alternative fit indices to assess the fit of the model. These fit indices take in consideration two aspects: the fit and the simplicity of the model. Most goodness-of-fit indices still depend on sample size and distribution, but the dependency is much smaller than that of the routine chi-square test. In general, the Adjusted Goodness of Fit Index (AGFI) and the Tucker Lewis Index (TLI) - also called Non-Normed Fit Index (NNFI) - have the best overall performance. A value on the goodness-of-fit indices of at least .90 is required to accept a model, while a value of at least .95 is required to...
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judge the model fit as good. Another check is the Root Mean Square Error of Approximation (RMSEA), which has to be smaller than .05 for a good model.

If the fit of a model is inadequate, the model might be modified by deleting parameters that are not significant, and adding parameters that improve the fit (Hox, 1998). Choices about adding parameters in order to conduct a sequence of model modifications, are often based on the values of the so-called Modification Indices (Hox & Bechger, 1998). The value of a modification index is the minimum amount that the chi-square statistic is expected to decrease if the corresponding parameter is changed.

When several models are an elaboration of each other, the chi-square and degrees of freedom of the models can be compared to determine which model is the best. However, associated with all these model modifications is the danger of capitalization on chance properties of the sample. Generally, the advice is to make modifications in the model only when there is a theoretical basis for them. Many authors recommend an alternative strategy for the development and evaluation of SEM models: the use of multiple a-priori models and cross-validating on a different sample. The first alternative strategy is used in this study. The second alternative strategy is impossible due to our limited sample size (N=315).

7.2 Confirmatory factor analyses

Before starting the SEM procedures for the meaning of network aspects for adjustment and well-being (research question c), three confirmatory factor analyses were carried out in order to improve the goodness-of-fit of the total SEM analysis. Another goal of the confirmatory factor analyses is to study the structure of the latent variables, based on our data of blind and visually impaired adolescents. In our study we use the SEM analysis in an exploratory way. The path diagrams are based on theoretical considerations, and the results of analysis of Chapter 5 and 6 as well. In section 7.2.1, the confirmatory factor analysis for the network aspects are presented, followed by the results for adjustment (7.2.2). Finally, the findings of the confirmatory factor analysis for well-being (7.2.3) are presented. Each analysis is based on 294 participants; 22 participants were removed from the sample because they had missings on one or more variables used in the analysis. The analysis are based on correlations between variables. The mentioned path estimates, or parameter values, in the figures are standardized.

7.2.1 Confirmatory factor analyses: network aspects

With AMOS software we tested the factor structure of the structural and functional network aspects. For one of the network aspects, social support, we used two instruments: the Social Network Grid and the Personal Network List (see Chapter 5). To simplify the factor structure of network aspects, we combined these two measures for social support into one social support
variable. The correlations between the scores on the two original instruments - between .39 and .54 - showed that this combination was meaningful. In this way, three variables were computed: a total social support score - support from all network members -, social support from parents, and social support from peers. This creation of new social support scores has consequences for the comparison with the sighted adolescents of the two reference projects. However, the comparison of the factor structures had less priority for this part of our study. More important in that regard is the comparison of the meaning of network aspects, which will be discussed in section 7.4.3.

We started the confirmatory factor analysis for network aspects with the AMOS program, using just one factor: network quality. The observed network variables, structural and functional network aspects, served as indicators. We found no admissible solution using one factor and the modification indices provided us with unsuitable changes.

The second AMOS model contained two factors, called 'structural network quality' and 'functional network quality', as based on the theoretical distinction explained in the Chapters 2 and 5. We started with several indicators for both factors. The final and best model is presented in figure 7.2.

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Figure 7.2  AMOS model for network aspects (N=294)
The model is accepted ($\chi^2 = 34.53$, df 24, $p=.08$) and the goodness-of-fit indices prove that it fits our data well (AGFI=.95; TLI=.96; RSMEA=.04). The model weakens significantly if more than the presented two indicators - for instance the percentage of kin members - for the factor structural quality are used. Not all the paths in the final model are significant. However, deletion of insignificant paths did not significantly improve the model acceptance and fit. Therefore the paths are still in the model, but they are presented as dotted arrows. The model significantly improved when the arrow between the factors structural quality and functional quality was added, although this path coefficient is by itself not significant. Logically, the error terms of total reciprocity, reciprocity with parents and reciprocity with peers are significantly correlated.

For the factor structural quality of the network, network size is the strongest indicator. Out of the variance of the variable network size, 43% is explained by the factor. Though the path between the percentage visually impaired network members is not significant, interestingly it is positively related to structural quality of a network.

The factor functional quality explained mainly the variance of the social support variables, and only weakly the variance of reciprocity and satisfaction regarding the support. The variables social support from peers and total social support are the most important - positive - indicators for the factor functional network quality, respectively 74% and 61% of their variance is explained by the factor.

Although several insignificant paths occur in the model, we do accept and use it as the factor structure of network aspects in our study. The chi-square test and the goodness-of-fit indices tell us we can do so. Moreover, the factor structure simplifies the relations between network aspects and it simplifies the associations that possibly exist with other factors in our study, like well-being or adjustment as described in section 7.4. Therefore, this factor model will be used in the final SEM analysis to study the meaning of the network aspects (7.4).

7.2.2 Confirmatory factor analyses: adjustment

Two models for adjustment were tested with confirmatory factor analysis using the AMOS program. The first model was based on the model for adjustment of visually impaired British persons of Dodds et al. (1994). Could his model be confirmed with our results of visually impaired Dutch adolescents? The second model was based on results of other studies (see for more information the Chapters 2 and 6), and will be tested for goodness-of-fit regarding our data.

Adjustment according to Dodds et al.

Already in 1961, Cowen, Underberg, Verrillo and Benham studied and wrote about: 'adjustment to visual disability in adolescence'. Adjustment was determined in their study by indicators as self-concept, self-ideal discrepancy and acceptance. Dodds et al. (1991, 1993, 1994) described the following
indicators for adjustment: learned helplessness, depression, attributional style, self-esteem, locus of control, self-efficacy, handicap acceptance and attitude towards visually impaired persons. These indicators were operationalized as items of the Nottingham Adjustment Scale. In our study we include several similar indicators for adjustment, partly measured with parts of this Nottingham Adjustment Scale (see section 6.1.1).

Correlations between our variables of the model for adjustment in replicating the structural model of Dodds et al. (1994) are high, as shown in table 7.1. Almost all variables significantly correlate with each other, with the exception of the correlation between locus of control and acceptance of the impairment.

Table 7.1 Correlation matrix of the variables for the model of adjustment

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Self-esteem</th>
<th>Well-being</th>
<th>Locus of control</th>
<th>Acceptance</th>
<th>Coping, problem-focused</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-esteem</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well-being</td>
<td>.36</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locus of control</td>
<td>.26</td>
<td>.25</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acceptance</td>
<td>.53</td>
<td>.33</td>
<td>.05</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Coping, problem-focused</td>
<td>.26</td>
<td>.20</td>
<td>.23</td>
<td>.20</td>
<td>-</td>
</tr>
</tbody>
</table>

To test models of adjustment, Dodds et al. (1994) formulated three models: the independent effects model, the self-esteem model, and the target model with two factors: self as an agent and internal self-worth. In the first model all variables in their study should have an effect on depression and self-esteem, but in no specific order and with no specific weighting. In the second model it was assumed that the effect of cognitive variables would be produced through self-esteem. In the third model, two factor scores are assumed: beliefs about control are indicators for the factor self-as-an-agent, and depression and self-esteem will define the factor internal self-worth. These three models are compared for goodness of fit by means of LISREL analysis, using the data of 469 British adults (21-48 years of age) who just lost their sight.

Testing all three models in his study showed that the third model, with the two factors, had by far the best fit (TLI .88). It showed a significant improvement with the other models. Figure 7.3 presents the model's path diagram with the associated path and factor coefficients as found in the British study. The model helps to clarify the structure of adjustment for blind British adults, and suggests ways in which the variables relate to one another (Dodds et al., 1994).
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In our study with visually impaired Dutch adolescents, we included most of the variables as presented in figure 7.3, serving as indicators of adjustment. Therefore we can test this structural model of figure 7.3 in our sample. A few restrictions compared with figure 7.3 had to be made: we did not include attitudes to blindness, attributional style, and self-efficacy in our study. Instead of anxiety/depression we measured well-being. Coping strategies were used instead of attributional style in our model of adjustment. Another change was the missing of self-efficacy, therefore the factor self-as-an-agent was also missing and paths were drawn directly to locus of control. For the concept of locus of control the results were based on Peetsma’s scale, because Dodds’ scale proved to have a poor reliability (see section 3.6). The following input model, figure 7.4, was tested with AMOS in our sample.
The adjusted model of Dodds et al. (1994) as presented in figure 7.4, does not fit our data very well ($\chi^2 = 14.31$, df 3, $p=0.003$). The chi-square test is significant so this model should be rejected, the AGFI and TLI goodness-of-fit indices are low and the RSMEA is high (AGFI=.91; TLI=.85; RSMEA=.11). Comparison with the Dodds model revealed that the strong relation between acceptance and locus of control in their group, did not exist in our group as already stated in the correlation table 7.1. Their weak relation between acceptance and internal self-worth, was a rather strong relation in our group. The relation between locus of control and internal self-worth was not so strong in our group, compared with the findings of Dodds et al. (1994).

Based on literature (Chapter 2), we changed our model resulting in figure 7.5. Amos analysis showed the following results: the chi-square test is not significant ($\chi^2 = 2.78$, df 3, $p=0.43$), so this model is accepted. Also, the AGFI and TLI goodness-of-fit indices are very high, and the RSMEA is low (AGFI=.98; TLI=1.00; RSMEA=.00).

Figure 7.5 Model for adjustment of visually impaired adolescents (N=315), based on the British model

All paths proved to be significant on a .05 level. Acceptance of the impairment shows a strong relation with internal self-worth: this was not the case with British adults. The relation of acceptance with locus of control is mediated by coping strategies, which is also not the case with British adults. The relation between coping and internal self-worth is significant but seems to be not as strong as in the British group. It seems that the role of internal self-worth is more important for adjustment in our sample than the self-as-agent. In general, our model for adjustment shows some similarities with the British model, but the relations between several variables (acceptance, coping strategies, locus of control and internal self-worth) are different. Of course this
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might be caused by the slightly different concepts used in our study. However, two other causes may have played a role: age of the participants and time of onset of their impairment.

The participants in our study are between 14 and 24 years of age, in the British study they were between 21 and 48 years of age. We cannot determine the effect of this age-difference. The second difference concerns time of onset of the impairment. British participants in the adjustment-study lost their sight recently. Our participants varied more in time of onset. Table 4.1 in Chapter 4 shows that 42% has a congenital disorder, 39% acquired their disorder before the age of 7, 13% before the age of 13, and 6% (n=19) have acquired their disorder recently (after they were 13 years of age). Nevertheless, we did not examine this difference in detail, because the subsamples are too small for multigroup Structural Equation Modeling.

Adjustment in our study

In our study, we consider all psychosocial characteristics as being indicators of one factor called adjustment. Already in Chapter 6 we presented results that confirm this approach. With this approach we join many other researchers, but, the distinguished adjustment indicators differ much between researchers. The main change compared with the British model, is the exclusion of well-being. In our study we defined well-being as a result of adjustment, and not as an indicator of it.

We started with including all the psychosocial characteristics in the confirmatory factor analysis with AMOS. The analyses showed three meaningful changes based on the modification indices (correlating several error terms and a restriction on the error of self-esteem, see figure 7.6). Our final model fits the data, the chi-square is not significant ($\chi^2 8.61$, df 4, $p=.072$). The goodness-of-fit indices are satisfying (AGFI=.96; TLI=.93; RSMEA=.06). All the paths in the model, see figure 7.6, are significant.

As figure 7.6 shows, the factor adjustment explains 96% of self-esteem and 34% of acceptation of the impairment. The percentages explained variance of the other indicators are low, however, their paths are significant. The correlations between the error terms of locus of control, problem-focused coping and acceptation of the impairment are significant too. The positive correlation between locus of control and using problem-focused coping strategies indicates that there is a positive association between them besides the overall joint correlation with the factor adjustment. The negative correlation between locus of control and acceptance indicates that there is an interesting negative association between the two variables, besides the overall joint correlation with the factor adjustment.

This factor model - that fits our data well - will be used in the final SEM analysis to study the meaning of the network aspects (7.4).
7.2.3 Confirmatory factor analyses: well-being

Instead of separately using all the observed well-being and loneliness variables (see 6.1.2) as dependent variables in a SEM analysis, we studied the factor structure of these variables (Kef, Habekothé & Hox, 1998). Earlier analyses demonstrated that the sense of general happiness and loneliness were significant indicators of a factor we called well-being (Kef et al., 1998). However, a latent factor or variable ideally should have more than two indicators. Next to the question concerning general happiness, we included questions in our study concerning the degree of happiness in three domains: happiness regarding school, sport and circle of friends (see table 6.3). We found significant correlations between the happiness in domains and the general feeling of happiness. It is conceivable that the contribution of the degree of happiness to the factor well-being differs between several domains. So, we decided to test the factor model with the AMOS program for well-being, using five indicators: general happiness, happiness in three domains, and the degree of loneliness.

The model fits the data very well, $\chi^2 = 7.11$, df 4, p=.13 (AGFI=.96; TLI=.97; RSMEA=.05). So, the model - see figure 7.7 - is accepted as an adequate representation of the data (N=294). All the paths in figure 7.7 are significant. A negative correlation, -.38, is presented between the error terms of happiness regarding school and regarding circle of friends. Without this correlation between these error terms, the model's fit was significantly worse. This negative correlation between the error terms of happiness regarding school and
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circle of friends indicates that there is a negative association between them, besides the overall joint correlation with the factor well-being.

The factor well-being explained 44% of the variance of loneliness, 65% of the variance of happiness with regard to the circle of friends. Furthermore, the factor explains 38% of the variance on general happiness, 28% of happiness concerning school and only 4% of happiness on sport issues. The strongest paths are therefore the paths to the indicators: happiness regarding circle of friends, loneliness and general happiness. The happiness variables have a positive association with the latent factor well-being, and loneliness has a negative association with the factor well-being.

This factor model - that fits our data well - will be used in the final SEM analysis to study the meaning of the network aspects (7.4).

Figure 7.7 AMOS model of well-being (N=294)

7.3 Correlational results: meaning of network aspects for visually impaired adolescents

In this section, a distinction is made between the correlational results concerning network aspects and adjustment and its indicators (7.3.1), and the correlational results for network aspects, well-being and loneliness (7.3.2). The correlations are reported in table 7.2. The bivariate correlations function as indicators for testing the explanatory models with multivariate structural equation modeling in section 7.4.
7.3.1 Meaning of network aspects for adjustment

What is the association between network aspects and psychosocial characteristics, for example the relation between network size and acceptance of the impairment? The correlational results are presented for four psychosocial characteristics and for the factorscore of adjustment in table 7.2.

Three significant relations are found between network aspects and self-esteem, but they are not very strong. Participants who are satisfied with social support have a higher level of self-esteem. So do participants who listed few professional careworkers and adolescents who perceive a more reciprocal relationship with their network members. The amount of social support has no significant relation with self-esteem. This holds for support from parents as well as the support from peers.

A high level of internal locus of control shows only two small significant relations, namely with a more reciprocal relationship with network members. The second relation is between a high level of internal locus of control and having few visually impaired network members.

Eight significant relations are found between network aspects and the frequency of using problem-focused coping strategies: five relations with functional network aspects and three with structural aspects. We found relations between often using problem-focused coping strategies and: having a romantic partner, perceiving more balance in support exchanging, listing many friends, more balance in the relation with peers, feeling satisfied with the social support, high support from the total network, high support from peers, and listing many persons from school or work.

Does the relation between network size and acceptance of the impairment as mentioned in the introduction of this section, exist? Correlational results show that this specific relation does not exist in our sample. Four network aspects do significantly relate with psychosocial characteristics: three functional aspects and one structural aspect. A high level of acceptance of the impairment does relate with: a high satisfaction with support, a more balanced relation with parents, a more balanced relation with all network members, and a small size of the sector extended family members.

The pattern of more significant relations with functional aspects compared with the number of significant relations with structural aspects, also exists with the factor score adjustment. A high level of adjustment significantly relates with three functional network aspects and one structural network aspect. Adolescents who have a relatively high level of adjustment are: more satisfied with social support, experience more reciprocal relationships, experience more support from peers, and have a romantic partner.
<table>
<thead>
<tr>
<th></th>
<th>network size</th>
<th>size close family</th>
<th>size extended family</th>
<th>size friends</th>
<th>size class/coll.</th>
<th>size club</th>
<th>size neighbors</th>
<th>size prof.</th>
<th>% vis. imp</th>
<th>% vis. imp friends</th>
<th>partner</th>
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<td>.01</td>
<td>.04</td>
<td>-.08</td>
<td>.08</td>
<td>.02</td>
<td>.05</td>
<td>.01</td>
<td>-.16**</td>
<td>-.02</td>
<td>-.05</td>
<td>.08</td>
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<tr>
<td>locus (thea)</td>
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<td>.03</td>
<td>-.00</td>
<td>-.03</td>
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<td>.05</td>
<td>-.09</td>
<td>-.12*</td>
<td>-.03</td>
</tr>
<tr>
<td>coping probl.</td>
<td>.12</td>
<td>.09</td>
<td>.01</td>
<td>.15*</td>
<td>.12*</td>
<td>-.02</td>
<td>-.08</td>
<td>.06</td>
<td>-.03</td>
<td>-.06</td>
<td>.17**</td>
</tr>
<tr>
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<td>-.04</td>
<td>.01</td>
<td>-.14*</td>
<td>.06</td>
<td>-.04</td>
<td>.02</td>
<td>-.01</td>
<td>-.02</td>
<td>-.01</td>
<td>.03</td>
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<td>-.07</td>
<td>.14*</td>
</tr>
<tr>
<td>well-being</td>
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<td>.03</td>
<td>.07</td>
<td>.00</td>
<td>-.03</td>
<td>-.03</td>
<td>.02</td>
<td>.07</td>
<td>.02</td>
<td>.05</td>
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<tr>
<td>loneliness</td>
<td>-.07</td>
<td>-.06</td>
<td>-.05</td>
<td>-.14*</td>
<td>.03</td>
<td>-.02</td>
<td>.01</td>
<td>.07</td>
<td>.08</td>
<td>.09</td>
<td>-.14*</td>
</tr>
</tbody>
</table>

|                  | support total | support peers | support parents | satisfaction support | balance total | balance peers | balance parents |
|------------------|---------------|---------------|-----------------|---------------------|--------------|--------------|----------------|---------------|
| self-esteem      | .02           | .02           | -.05            | .22**               | .15*         | .06          | .04            |               |
| locus (thea)     | -.02          | .06           | .00             | .06                 | .14*         | .07          | .07            |               |
| coping probl.    | .12*          | .12*          | -.02            | .13*                | .17**        | .13*         | .03            |               |
| acceptance       | .02           | .10           | -.10            | .27**               | .15*         | .00          | .17**          |               |
| adjustment       | .07           | .14*          | -.05            | .28**               | .22**        | .09          | .12            |               |
| well-being       | .22**         | .19**         | .00             | .25**               | .07          | .09          | .03            |               |
| loneliness       | -.28**        | -.36**        | -.09            | -.36**              | -.06         | -.01         | -.03           |               |
It can be concluded that the quality or content of relationships with network members is more important for psychosocial functioning than the structure of the personal network. The negative - but not significant - relations between network size and parental support on the one hand, with acceptance and adjustment on the other hand were unexpected. Finally, we want to point out that all the significant correlations are low - between r=.12 and r=.28.

7.3.2 Meaning of network aspects for well-being and loneliness

What are the correlations between network aspects on the one hand, and well-being and loneliness on the other hand? We start with the correlations for well-being, followed by those for loneliness. The correlation with well-being concerns the total score consisting of the general feeling of happiness and happiness regarding three domains (see section 6.1.2)

Four significant correlations are found between network aspects and well-being (value of r between .25 and .14), see table 7.2. Three of them are with functional network aspects, just one is with a structural aspect. In other words, the quality of the network is more important for well-being than the structure of it. A higher satisfaction with support, more support in general, and more support from peers correlate with a higher degree of well-being. A larger sector close family members also correlates with feeling happier.

Five significant correlations are found between network aspects and loneliness (value of r between .36 and .14). Three of them are with functional network aspects. So again for the relation between network aspects and loneliness, the quality of the network is more important than the structure of it. A higher satisfaction with support, more support from peers, and more support in general correlate with less feelings of loneliness. Having a romantic partner and a larger sector friends also correlate with feeling less lonely.

7.4 Explanatory models: meaning of network aspects

The three models resulting from the confirmatory factor analyses, respectively for network aspects, adjustment and well-being, (figure 7.2, 7.6, and 7.7) are combined to test an explanatory model of the meaning of network aspects for blind and visually impaired adolescents. We use our model of adjustment instead of the Dodds model, because we consider all psychosocial characteristics as being indicators of one latent factor called adjustment. The main change of our model compared with the British model, is the exclusion of well-being. In our study we defined well-being a result of adjustment, and not an indicator of it.

With Structural Equation Modeling we wanted to test the fit of the explanatory model. Results for the total group visually impaired participants are presented in 7.4.1, thus answering research question c.1. In the next section, 7.4.2, results are presented concerning the direct and indirect effects of several background characteristics, research question c.2. The last section,
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7.4.3, concerns the comparison of our results with results of the adolescents in the reference projects of the Universities Leiden and Utrecht, answering research question c.3.

7.4.1 Meanings of network aspects for visually impaired adolescents

In this section, question c.1 is answered:

c.1 What is the association between on the one hand aspects of the personal network and on the other hand psychosocial characteristics, well-being and loneliness of blind and visually impaired adolescents?

All three confirmatory factor models - figure 7.1, 7.6, and 7.7 - form the basis of the explanatory model. In creating the explanatory model, the paths within the three separate models were not fixed. We added paths from the latent variables structural network quality and functional network quality to the factors adjustment and well-being. A path is also drawn from adjustment to well-being. This was the first model, our base model.

It proved to fit our data not so well ($\chi^2 = 317.5$, df 142, p=.00, AGFI=.87; TLI=.80; RSMEA=.065). The highest modification index estimate of the suggested indices (see section 7.1), concerned a correlation between the error terms of general happiness and loneliness. Based on knowledge and peer review we tried this extended model. The model improved significantly (see table 7.3), although its fit was still poor ($\chi^2 302.7$, df 141, p=.00, AGFI=.87; TLI=.81; RSMEA=.06).

Table 7.3 Testing explanatory models using SEM (N=294)

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2$</th>
<th>df</th>
<th>delta$\chi^2$</th>
<th>delta df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>base model</td>
<td>317.5</td>
<td>142</td>
<td>-</td>
<td>-</td>
<td>&lt; .01</td>
</tr>
<tr>
<td>second model</td>
<td>302.7</td>
<td>141</td>
<td>14.8</td>
<td>1</td>
<td>&lt; .01</td>
</tr>
<tr>
<td>third model</td>
<td>281.0</td>
<td>140</td>
<td>21.7</td>
<td>1</td>
<td>&lt; .01</td>
</tr>
<tr>
<td>fourth model</td>
<td>257.0</td>
<td>139</td>
<td>24.0</td>
<td>1</td>
<td>&lt; .01</td>
</tr>
</tbody>
</table>

The highest suggested and most plausible modification index estimates of this second model concerned correlations between the error terms of the total social support, and the support from parents and peers. Again, based on knowledge and peer review, we added these paths to the model. We also had to restrict the variance of the error of size, in doing so.

The model significantly improved (see table 7.3), although the fit of this third model was still not satisfying ($\chi^2 281.0$, df 140, p=.00, AGFI=.88; TLI=.84; RSMEA=.059). The analysis results of this third model showed one more large modification index: a path from acceptance of the impairment to well-being.
Adding this path could be functional because an association between these concepts is conceivable. This fourth model was a significantly better model, see table 7.3.

The chi-square test was still significant ($\chi^2 = 257.0$, df 139, $p = .00$). However, this could have been caused by our sample size. The goodness-of-fit indices of this fourth model showed that the fit is just good (AGFI = .89; TLI = .86; RSMEA = .059). For reasons of clarity and clearness we excluded the not significant paths from structural network quality to adjustment and well-being in the fourth model. The results for the fit of this fifth model are: ($\chi^2 = 258.1$, df 141, $p = .00$, AGFI = .89; TLI = .86; RSMEA = .053). We therefore accept it as the best model for our data. The model and the estimated parameter values are presented in figure 7.8.

The model presented in figure 7.8 shows that the only significant effect of the factor structural network quality is on the factor functional network quality. Structural network quality has no direct significant paths to adjustment or well-being.

The factor functional network quality proves to have a significant and positive path to adjustment. However, the variance of the factor adjustment is for only 4% explained by this path. The functional network quality is also more important for the factor well-being than the structural network quality. The path from functional network quality to well-being is significant. However, because of the relation between the factors structural network quality and functional network quality, structural quality also has some significance. From the network aspects, the size of the personal network, the amount of peer support and support from all network members are the most important aspects. The influence of satisfaction with the perceived support must not be ignored too.

Adjustment is also an important factor for well-being. All the factors together - adjustment and the two network factors - explain 69% of the factor well-being. All the paths are positive. From the factor adjustment, the strongest paths are to self-esteem and acceptation of the impairment. Therefore, these variables also have the largest association with well-being. Especially the acceptation of the impairment is important, because of its direct relation with well-being too.
Figure 7.8  AMOS model of the meaning of network aspects (N=294)
7.4.2 Effect of background characteristics

In this section, results regarding the direct and indirect effects of several background characteristics are presented. So research question c.2 is answered:

c.2 What are the direct and indirect effects of several background characteristics of participants on the explanatory model of the associations between variables?

On the basis of the regression results, mentioned in Chapters 5 and 6, only the most importing characteristics are studied. These are also the characteristics most often involved in other studies, which gives us opportunities for comparison.

We studied the effect of two socio-demographic variables: sex and age. Furthermore we included three vision-related variables: severity of impairment, kind of disorder - progressive of stable -, and dependency regarding mobility. Finally we studied the effects of three context variables: two dummy variables for living situation, and kind of education (regular or special). All the nominal variables (sex, kind of disorder, living situation and kind of education) were used as dummy variables - with the values zero and one - in the structural equation modeling analysis.

For two reasons we did not include all the eight above described background characteristics at once in one AMOS model. Firstly, we were not primarily interested in the interactive effects between the various background characteristics on the several factors in the model. Certain limitations had to be made in a research with a restricted period of time. Secondly, the model would be very complex and difficult to oversee and understand. Because of the large quantity of paths drawn to all the factors, the simplicity of the model would certainly decrease. Therefore the direct and indirect effects of background characteristics in the model as presented in figure 7.8, were studied separately for each of the eight characteristics. Presenting the multitude of eight AMOS models in eight figures in this chapter would not be relevant. All the models are therefore included in Appendix IVa through IVh. Before explaining the effects of the background characteristics we have to point out that the accepting and fitting results of these SEM models are not optimal. This could be caused by our sample size. All the results in this section are therefore explorative and should be tested in future research.

The effects of the dummy variable sex (0=female, 1=male) are visible in a nearly fitting model ($\chi^2 280.1 \text{ df } 156 p=.00 \text{ AGFI=.89, TLI=.86, RSMEA=.05}$). Analysis results show that the path between sex and structural network quality is insignificant. Excluding this insignificant path did not improve its fit. So, sex has a direct effect on well-being, and it has indirect effects on well-being, via the factors functional network quality and adjustment. The effects of sex on adjustment and well-being are positive, meaning that females have more problems regarding adjustment and well-being. Nevertheless, females have a
slightly higher score on functional network quality. With the structure as presented in the model (Appendix IVa), the explained variances of the factors are: well-being 78%, adjustment 16%, functional network quality 18% and structural network quality 0%. The total effect of sex on well-being through the three factors is positive: .05, indicating that males have a slightly higher score than females.

What are the effects of age? Including the variable age (1=14-18, 2=18-21, 3=21-24) in the AMOS model resulted in this best model: $\chi^2 283.4$ df 158 $p=.00$ AGFI=.89, TLI=.86, RSMEA=.05. Deleting or adding the theoretical relevant paths, as in part suggested by the modification indices, did not improve the model. Analysis results show that there are only two effects of age on the four factors in our model: a direct significant effect on well-being and an effect on structural network quality. The parameter for well-being is negative (-.12) meaning: with increasing age, well-being decreases. The path to structural network quality is positive, meaning that a high score on this factor is associated with increasing age. Age has no direct effects on the factors adjustment and functional network quality. With the structure as presented in the model (Appendix IVb), the explained variances of the factors are: well-being 70%, structural network quality 2%, functional network quality 4% and adjustment 4%. The total effect of age on well-being through the two factors is negative: -.10, indicating that with increasing age the score on well-being decreases.

Including the characteristic severity of the impairment (a low score is less to no vision, a high score is relatively more vision) in the explanatory model resulted in the following effects. The best model included paths to three factors: well-being, adjustment and functional network quality ($\chi^2 301.0$ df 157 $p=.00$ AGFI=.88, TLI=.84, RSMEA=.06). One path is significant: to well-being. The paths to adjustment and functional network quality are just not significant. Deleting one or more paths did not significantly improve the model. So, the severity of the impairment has a direct positive significant effect (.17) on the factor well-being, indicating that participants with more vision are happier. The path to adjustment is also positive (.09) meaning that blind adolescents reported more adjustment problems than visually impaired adolescents. In contrast, the path to functional network quality is negative (-.17). Adolescents with less vision scored higher on these factor than adolescents with more vision. With the structure as presented in the model (Appendix IVc), the explained variances of the factors are: well-being 71%, adjustment 5%, functional network quality 6% and structural network quality 0%. The total effect of level of remaining vision on well-being through the three factors is positive: .19, indicating that with more vision the score on well-being increases.

The effects of the dummy variable kind of disorder (0=stable disorder, 1=progressive disorder) are presented in a model which nearly fits based on the goodness-of-fit indices ($\chi^2 281.7$ df 156 $p=.00$ AGFI=.89, TLI=.86, RSMEA=.05).
Analysis results show that the parameters between kind of disorder and functional network quality, and kind of disorder and well-being, are insignificant. Excluding this insignificant paths did not improve the models’ fit. So, kind of disorder has no direct effect on well-being, it only has indirects effects on well-being, and mostly via the factor adjustment (-.15). This negative path shows that participants with a progressive disorder reported more adjustment problems. On the other hand, the significant path to structural network quality is positive (.15), indicating that for this factor the participants with a stable disorder have a lower score. The total indirect effect on well-being via structural network quality and adjustment is negative too (-.01), indicating that participants with a stable disorder have less problems regarding this factor than do participants with a progressive disorder. With the structure as presented in the model (Appendix IVd), the explained variances of the factors are: well-being 69%, adjustment 7%, structural network quality 2% and functional network quality 3%.

Does the characteristic dependency regarding mobility has direct and indirect effects on the four factors in the model? A low score on dependency means less dependent, a high score means more dependent regarding mobility. AMOS analysis ($\chi^2$ 293.2 df 158 p=.00 AGFI=.89, TLI=.85, RSMEA = .05) showed that only two paths to the factors are significant. Degree of dependency regarding mobility has a direct negative effect on adjustment (-.18) and a direct negative effect on well-being (-.09). Leaving out the non significant paths to the two network quality factors did not significantly improve the model. The two effects show that participants who feel more dependent on other persons regarding their mobility reported more problems concerning adjustment and well-being. With the structure as presented in the model (Appendix IVe), the explained variances of the factors are: well-being 70%, adjustment 9%, structural network quality 0% and functional network quality 3%. The total effect of dependency regarding mobility on well-being is negative: -.12, indicating that participants who feel independent regarding their mobility have a higher score on well-being.

Finally, the effects of the three context characteristics are described: kind of education, living in an institute or not, and living independently or not. Structural equation modeling analysis revealed that the dummy variable kind of education (0=ever special education, 1=always regular education) has only one significant effect on the four factors ($\chi^2$ 291.6 df 159 p=.00 AGFI=.89, TLI=.85, RSMEA = .05). Kind of education has a direct positive effect (.13) on well-being, indicating that participants who always attended regular education reported feeling happier. With the structure as presented in the model (Appendix IVf), the explained variances of the factors are: well-being 70%, adjustment 4%, structural network quality 0% and functional network quality 4%.
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What are the structural equation modeling results for the dummy variable living in an institute (0=not living in an institute, 1=living in an institute)? Results demonstrated that this characteristic has no significant effects on the four factors in the model ($\chi^2 309.3$ df 156 $p=.00$ AGFI=.88, TLI=.83, RSMEA = .06). Excluding insignificant paths one by one did not significantly improve the model and the paths still remained insignificant. The appendix shows therefore the model with all four insignificant, dotted, paths. With the structure as presented in this model (Appendix IVg) the explained variances of the factors are: well-being 69%, adjustment 5%, structural network quality 0% and functional network quality 4%. In the regression results described in Chapter 5 and 6, this characteristic could predict the dependent variables rather well. Probably, the combination of observed variables into latent variables in our explanatory model could have resulted to this SEM result.

Lastly, the effects of the dummy variable living independently (0=not living independently, 1=living independently) was studied with SEM (0=not living independently, 1=living independently). The best model, with excluding the not significant paths to functional network quality and adjustment, showed that there are two significant paths to the factors structural network quality and well-being ($\chi^2 295.4$ df 158 $p=.00$ AGFI=.88, TLI=.85, RSMEA = .05). The path to structural network quality is positive (.13) indicating that participants living independently reported higher scores on this factor. Nevertheless, the significant path to well-being is negative (-.10), meaning that these adolescents feel less happy. The total effect on well-being is negative (-.08), so participants who live independently reported more problems concerning well-being. With the structure as presented in this model (Appendix IVh) the explained variances of the factors are: well-being 71%, adjustment 5%, structural network quality 2% and functional network quality 4%.

In sum, the explorative analyses on the effects of the background characteristics on the four factors in the explanatory model showed that the effects are small, and often not significant. Nevertheless, six of the eight variables did have a direct effect and some indirects effects on well-being and the explained variance of the factors did increase when adding specific background characteristics.

The explained variance of the factor well-being increased mostly by adding sex in the explanatory model, an also the characteristics level of remaining vision and living independently added explained variance. Sex also added the most explained variance to the factor adjustment, followed by kind of disorder and dependency regarding mobility.

More of the variance of the factor functional network quality could be explained when sex was added in the model. The background characteristics that increased the amount of explained variance of structural network quality were age, kind of disorder and living independently.

To conclude, the vision-related characteristics relatively have the strongest effects, followed by the socio-demographic characteristics sex and age.
7.4.3 Comparison of our results

In this section, the meaning of the network aspects for blind and visually impaired adolescents is compared with the results regarding the two reference projects: of Leiden University (Buysse, 1997) and of Utrecht University (Rispens, Hermanns & Meeus, 1996). In this way research question c.3 is answered:

c.3 In what way do blind and visually impaired adolescents differ from sighted adolescents with respect to these associations?

In Chapter 8 our results will be compared with general literature, to study similarities and differences of the results of visually impaired Dutch adolescents with results of other groups of persons.

Buysse (1997) studied the direct and indirect influences of network aspects and psychosocial characteristics on internalizing behavior problems and on anti-social behavior problems of adolescents with three kinds of analysis: correlations, regression and structural equation modeling. Because of the small subsamples in her study, data of all adolescents (N=142) were used in all these analyses. No sample effects were found, so her results can be interpreted for the reference group of adolescents and the participants with behavior problems. For all three kinds of analysis, data were used from time 1 in her study.

The first kind of analysis concerned bivariate correlations between behavior problems, network aspects, risk factors in the person and risk factors in the environment. Moderately strong relations were found between internalizing behavior problems with loneliness and low self-esteem. Anti-social behavior problems did correlate with ineffective coping. Two correlations were related to support: adolescents with a high self-esteem perceived high support from father, and participants with ineffective coping perceived less total support. Her conclusion was: "only a few network aspects were directly associated with behavior problems, and these were functional aspects" (Buysse, 1997 p.166.). Especially the functional aspect 'perceived conflict' showed some relations, which we did not mention because this aspect is not included in our study.

Furthermore, multiple regression analyses were used to study interactive relations in her study into behavior problems of adolescents (Buysse, 1997). Only functional network aspects for family and peers, were included as predictors in these regression analyses for dependent variables: internalizing behavior problems and anti-social behavior problems. Significant predictors for high internalizing problems were: loneliness, high risk school careers, strict attitudes towards delinquent activities and delinquent peers. Predictor for high anti-social problems was having delinquent peers. The explained variance was approximately 42%, and the abovementioned results show no direct relations with perceived support from family and peers. Five regression analyses were carried out in order to determine the relation of risk factors in the environment
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and functional network aspects on five different psychosocial risk factors in the person (self-esteem, locus of control, coping, attitudes and loneliness). The explained variance of all models was low, between 4% and 16%, and the network aspects were no important predictors. Only high perceived family support predicted effective coping.

In an explorative way, structural equation modeling was used to determine direct and indirect effects of selected variables on behavior problems of Dutch adolescents (Buysse, 1997). Three functional network aspects for the family and the peers system were included in the model: perceived support, perceived conflict and importance of their opinion. Based on the correlation and regression results, she did not include structural network aspects in the SEM analysis. The first model tested had a good fit. The network aspects functioned as mediating, intervening variables. Very few direct effects of the network aspects were found on internalizing and anti-social behavior problems. The results indicated that personal risk factors as loneliness, low self-esteem and perceived conflict lead to high levels of internalizing behavior. All indirect effects were small, so the personal factors mostly had a direct effect. For anti-social behavior problems some effects were found of high perceived support from a delinquent peer group and high risk school careers.

A second model with network aspects and risk factors in the environment as independent variables and risk factors of the person as mediating variables fitted Buysse's data also, but the model was not a significant improvement of the abovementioned model.

The comparison of our results with those of other adolescents can only be made with some reserve, because in the study of Buysse, a few network aspects were included that were not included in our study, like perceived conflict and importance of opinion. Taking this difference in mind, an important similarity in Buysse's study and our study is the small importance of structural network aspects and the marginal importance of functional network aspects. As Buysse found, we also can conclude that personal characteristics and context factors are important factors too. Both studies demonstrated nevertheless, that aspects of personal networks should be considered in both research and practice (see Chapter 8).

The second comparison with results of non-impaired adolescents is the one with the data and results of the reference project of Utrecht University. In this project 'Rearing in the Netherlands', adolescents aged between 12 and 19, and their parents filled in several self-report questionnaires. Due to the recency of this project, the amount of available reported results is small. No publication was found considering the relation between the perceived social support on the Personal Network List (PNL) and the psychosocial characteristics of adolescents in this project. Two publications that were found concerned the relation between rearing behavior of parents and the psychosocial development of adolescents (Noom, Dekovic & Meeus, 1996; Meeus, Dekovic & Noom, 1996). Several dimensions were divided in rearing behavior of parents: supporting, monitoring, authoritarian control and authoritative control. We use the results
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concerning the dimension supporting, in describing the relation between parental support and psychosocial development or behavior problems of adolescents. However, supporting as a rearing style and the perceived parental support from the perspective of the adolescents are two different concepts.

Regression analysis revealed that a high supporting rearing style, especially from father, significantly predicted less internalizing behavior problems and a good development of the identity of the adolescent (Noom et al., 1996). Most important for a good psychosocial development were, however, characteristics of the adolescents like sex and temperament. The influence of aspects of the peer group or risks in the school situation were not included in their analyses, but on the basis of the literature, some significant effects of these factors on adolescents' development were expected.

A second set of analyses were performed using the perception of the adolescents of the rearing style dimensions of their parents, instead of the scores of the parents themselves. The regression results showed that higher levels or parental support and monitoring were associated with less internalizing and externalizing problem behavior (Meeus et al., 1996). Indicators for internalizing problem behavior were: depression, well-being, physical health, self-esteem, thoughts about suicide and satisfaction of life.

It can be concluded from these publications that parental support as a dimension of rearing style is of importance for the development of adolescents, however, its association with developmental outcomes is small.

7.5 Summary

The aim of this Chapter is to gain more insight into the associations between network aspects, adjustment, well-being and background characteristics of participants like age or the severity of the visual impairment. It is composed of results concerning three confirmatory factor analyses using the AMOS program, correlational results concerning the meaning of network aspects for other variables in our study, and a large set of Structural Equation Modeling (SEM) results.

The confirmatory factor analyses for the structure within the network aspects revealed a two-factor structure. Factors called the structural network quality and the functional network quality underly respectively the specific structural and functional network aspects. The strongest indicators were: size of the network, total support and support from peers and satisfaction with support.

One factor called adjustment, was found with the confirmatory factor analyses using the psychosocial characteristics. All the paths of the indicators for this factors were significant, self-esteem and acceptance of the impairment were the most important indicators for adjustment. Besides the joint positive association of internal locus of control and acceptance with adjustment, a negative correlation existed between locus of control and acceptance. This means that there also was a contradiction in the results of these two variables:
a high score on internal locus of control could be associated with a low score on acceptance and vice versa.

An acceptable one-factor structure regarding well-being was found for our data of blind and visually impaired adolescents. All the paths of general happiness, happiness regarding school, sport and circle of friends, and loneliness to the factor well-being were significant. Happiness regarding sport was less important and the general feeling of happiness and loneliness were the most important indicators for the factor well-being. Besides the joint positive association of happiness regarding school and circle of friends with well-being, a negative correlation existed between happiness on these two domains. This means that there also was a contradiction in the results of these two variables: a high score on happiness regarding school could be associated with a low score on happiness regarding circle of friends and vice versa.

The three separate factor structures were then combined into an explanatory model regarding the direct and indirect relations between all four factors. Before doing so, we described correlational results of the structural and functional network aspects on the one hand and psychosocial characteristics, well-being and loneliness on the other hand. These correlation results showed that a few moderate correlations were found. In general, the functional network aspects had more meaning in this regard than the structural network aspects. Most important network aspects for the psychosocial characteristics, well-being and loneliness were: satisfaction with the perceived social support, a reciprocal helping relationship, high support from peers, high total social support, having a romantic partner and listing many friends.

We used Structural Equation Modeling to study the direct and indirect relations between the four factors in an explorative way. The final most appropriate model that we found was not perfect. We had to make some, theoretical conceivable, changes in creating this model. The model approximately fits, therefore the interpretations of the results should be considered with caution.

Four significant positive paths were found. The first path was between structural network quality and functional network quality. The paths from structural network quality to the other factors - adjustment and well-being - were not significant. The factor functional network quality did have a meaning for adjustment and well-being. These two paths were significant and positive. Because support, and especially from peers, and satisfaction with the perceived support were the strongest indicators for the factor functional network quality, these aspects are the most meaningful for adjustment and well-being too. Adjustment had a significant strong path to well-being too. To conclude, the factor functional network quality is meaningful for well-being because of its direct and indirect effect on well-being. The factor structural network quality is less important in the group blind and visually impaired adolescents. The psychosocial characteristics were also important for well-being too. Using this explanatory model explains 69% of the variance of well-being.
Background characteristics of the participants had a few significant effects on the four factors. Sex, kind of disorder and dependency regarding mobility had the strongest effects on the factors. Age and living independently only contributed in some cases to a larger amount of explained variance. The regression results mentioned in the Chapters 5 and 6 showed some more relations between background characteristics and all the separate variables. Within the aggregated factor structure these effects become smaller. The SEM results cautiously indicate groups that are more at risk: younger adolescents, adolescents with a progressive visual impairment, females, participants who feel more dependent on persons regarding their mobility, blind participants and participants living independently.

What are the similarities and differences of our results compared with the results regarding the meaning of network aspects of the two reference projects? Similar were the (only) small effects of network aspects on adjustment and well-being, and especially concerning the meaning of the structural network aspects. Corresponding were the results regarding the importance of support for well-being or behavior problems, with the accent on the importance on support from peers. In our study the parental support even was less meaningful compared with the results of the two reference projects, but this might be caused by the older age of our participants.

The meaning of the concept 'satisfaction with the perceived social support' can not be compared because it was not included in the other studies. On the other hand, the importance of perceived conflict with network members, which had some effects in the Leiden project, could not be compared because we did not include this aspect.

To summarize, functional network aspects did have meaning for adjustment and well-being. The explanatory model statistically explained 69% of the variance of well-being which is satisfying. Including background characteristics improved the model only slightly, indicating that the network factors have more meaning than individual and context variables. Figure 7.9 shows the adjusted theoretical framework compared with figure 7.1, based on the association results of this Chapter.
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**BACKGROUND CHARACTERISTICS**
- SOCIO-DEMOGRAPHIC
- VISION RELATED
- CONTEXT

**FUNCTIONAL NETWORK QUALITY**
- ESPECIALLY: SOCIAL SUPPORT SATISFACTION WITH SUPPORT

**STRUCTURAL NETWORK QUALITY**
- SIZE
- % VISUALLY IMPAIRED NETWORK MEMBERS

**WELL-BEING**
- ESPECIALLY: GENERAL HAPPINESS LONELINESS

**ADJUSTMENT**
- ESPECIALLY: SELF-ESTEEM ACCEPTANCE OF IMPAIRMENT

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Figure 7.9 The adjusted theoretical framework