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## The Use of Health Transition Item in Health Inequalities Research: Annual Health Perception Variation Value (AHVV)

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## Research Article

**ABSTRACT**

**Purpose:** The introduction of the "Annual Health Perception Variation Value (AHVV)" that is developed by using Health Transition Item.

**Methods:** The sample size of this representative study is 3397 (38.6% male) with a mean age of 35.7 ± 22.5 years. The AHVV is developed by means of self-evaluated Health Transition Item of the SF-36 scale. AHVV is calculated for each of the 5 years age groups. The percentages of the positive responses are summed up and then subtracted from the sum of the percentages of the negative responses such as: AHVV= [(Much Better % + Somewhat Better %)] – [(Somewhat Worse % + Worse %)]. Fort he sake of making comparison with AHVV, "Current Self Rated Health Value (SRHV) is also derived from a SRH question, calculated by a similar methodology.

**Results:** Regardless of having any chronic illness, both SRHV and AHVV worsen as a person gets older and gets poorer. AHVV is affected by age (ß=0.36) more that that of SRHV (ß=0.08) whereas SRHV variance can be better explained by income level (ß =0.18) than AHVV (ß =0.05) in the multiple linear regression analyses. A significant linear trend in the mean AHV was observed by SRH categories.

**Conclusion:** AHVV can be regarded as a new population level parametric summary health transition index which can be used in health inequality research.

## INTRODUCTION

Self-rated Health (SRH) is a simple, practical and widely used method in the health inequalities literature, and in the evaluation of health service access [1-3]. Use of SRH becomes especially important for assessing health service access during health services reforms era, when conventional population health measures such as mortality rates do not work to probe health inequalities. SRH provides insight into a person's perception of current health status. Thus, it may be regarded as an "individual personal subjective health indicator" and it is not a population summary health measure. This poses a challenge when applying SRH to population studies. While SRH's pertain to current health, HTI's are retrospective; they provide insight into change of health status over time and as perceived by the individual. HTIs have mostly been used in three major areas in the clinical research: 1- as a primary measure of clinical outcome; 2- as an independent measure for construct validation of questionnaires and establishing questionnaire interpretability and 3- as estimates of minimum important difference in health related quality of life research [4-6].

Health transition ratings can also be used to retrospectively define groups that have changed or not changed. We adapted the use of the HTIs in the clinical research to the population level in health inequalities research. To our knowledge, there have been no prior inequality studies by using HTI.

Researchers in health inequalities generally prefer continuous/parametric variables. By their categorical/ordinal nature, SRH and HTI are not continuous/ parametric variables, they may be regarded as "raw variables". Community level tools such as "Relative Index of Inequality" has been developed in an effort to fulfill the need for continuous parametric variables. It is a numeric scale which converts individual categorical responses into a summary statistics [7-10]. One other difficulty for researchers face; arise from the fact that lower educated community groups have problems in understanding response scales having 5 or more descriptors and prefer more simple ones [11-14]. This necessitates an item with few response options to be converted to a numeric scale.

"Annual Health Perception Variation Value (AHVV)" is proposed for satisfying the need of creating a continous variable by using a simple categorical item:HTI. The aim of this paper is to demonstrate the application of this new mesure: "AHVV", in health inequality research.

# METHODS

## Subjects

The subjects and related data of this cross sectional study were extracted from the unpublished six representative population (Household Health Surveys) studies conducted in Manisa province - Turkey **(Table 1).** The total aggregated sample size is 3397 (38.6 % male) with a mean age of 35.7±22.5 years, a median value of 30.0 years (min:10, max:98) . The range of the response rate for these pooled studies is between 85% to 98%.

## Variables

The "Annual Health Perception Variation Value (AHVV)" is developed by means of the Turkish version of the self-evaluated health transition item (i.e 2nd –unscored item of the SF-36 scale): "Compared to one year ago, how would you rate your health in general now? (Bir yıl öncesiyle karşılaştırdığınızda, şimdi genel olarak sağlığınızı nasıl değerlendirirsiniz?)" with 5 points Likert type response scale [15]. The ordinal response options are: 1- Much better now than a year ago (Bir yıl öncesine göre çok daha iyi), 2- Somewhat better now than a year ago (Bir yıl öncesine göre biraz daha iyi), 3- About the same as one year ago (Bir yıl öncesiyle hemen hemen aynı), 4- Somewhat worse now than one year ago (Bir yıl öncesine göre biraz daha kötü) and 5- Much worse now than one year ago (Bir yıl öncesinden çok daha kötü).

AHVV is calculated for each of the 5 year age groups. The percentages of the options "Much better" and "Better" are summed and then subtracted from the sum of the percentages of "Worse" and "Worst" for each of the age group. The method may be formulated as:

AHVV= [(Much better ... %) + (Somewhat better ... %)] – [(Somewhat Worse ..% + Much Worse..%)]

The middle descriptor of the response scale (i.e., "About the same..") is considered as a neutral option and is omitted from this formula.

To allow a comparison of this newly proposed AHVV with Current Self-rated Health, we developed "Current Self-rated Health Value (SRHV)" using the same formula (i.e., sum of the percentages of the first two responses: "excellent + very good" minus sum of the percentages of the 4th and 5th responses: "fair + poor". A similar formula for Current SRHV is:

Current SRHV= (excellent% + very good % ) – (fair % + poor %)

Age, gender and perceived income are the other variables used in this study in addition to Current SRHV) and AHVV. Among these additional variables, age is used as a categorical variable (age group by 5) during the calculation of the AHVV and SRVH. Age is also utilized as a continuous variable in the regression analysis. Perceived income is evaluated by the question "How would you rate your financial situation and possessions?" with a 5 point Ordinal Response Scale : 1- Well above average, 2- Slightly above average, 3- Average, 4- Slightly below average, 5- Well below average.

A line graph is plotted for AHVV and SRHV by age group which shows special patterns for age, gender and income categories. The age group in which the AHVV line crosses the horizontal "zero" axis varies for different income and gender categories. Its expected that the older the age group crosses the zero line, the better the health inequality in that population.

## Statistical Analyses

Student's t test and One way ANOVA and Tukey's B analyses for Post-hoc comparisons were conducted for the bivariate analyses. Two multiple linear regression analysis were conducted by using HTI score (with a 5 points response scale) and Current SRH item score as dependent variables. This was done in order to see how these two variables were affected by independent socio-demographic variables and mutually by themselves.

Analyses were performed by SPSS 11.0 Statistical package.

# RESULTS

**Table 1.** "Study population composition: Six unpublished Household Health Surveys."

| Study | Population represented | Sample size | Sampling method | Mode of admin. | Mean age | M / F* (%) |
|---|---|---|---|---|---|---|
| District Health Service utilization survey | Manisa city centre | 616 | Multistage random cluster | Interviewer administered | 38.3 ± 12.3 | 45.5/54.5 |
| School Health Survey | Manisa city centre | 1093 | Stratified simple random | Self administered | 12.9 ± 1.0 | 49.0/51.0 |
| Quality of life of the elder population survey | Manisa city centre | 506 | Multistage random cluster | Interviewer administered | 73.8 ± 6.4 | 32.8/67.2 |
| District Health Service utilization survey | Muradiye district of Manisa | 318 | Multistage random cluster | Interviewer administered | 38.3 ± 15.4 | 0/100.0 |
| District Health Service utilization survey | Muradiye district of Manisa | 213 | Multistage random cluster | Interviewer administered | 38.7 ± 11.8 | 0/100.0 |
| Demographic health survey on Migrants | Manisa city centre | 651 | Multistage random cluster | Interviewer administered | 39.6 ± 16.6 | 50.8/49.2 |
| Overall | - | 3397 | - | - | 35.7 ± 22.5 | |

*Male / Female

An important portion of the respondents perceived their families' income as at about average income level (50.7%); 16.6% at over than average income level, and 32.7% as poor. Of the respondents 24.5% had no school education, 51.7% received only five years of compulsory-primary education and 23.8% was educated eight years and over. 26.7% stated presence of a pre-diagnosed any chronic health problem.

**Table 2.** "Distribution of the Current Self-rated Health Value (SRHV) and Annual Health Perception Variation Value (AHVV) according to 5 age intervals."
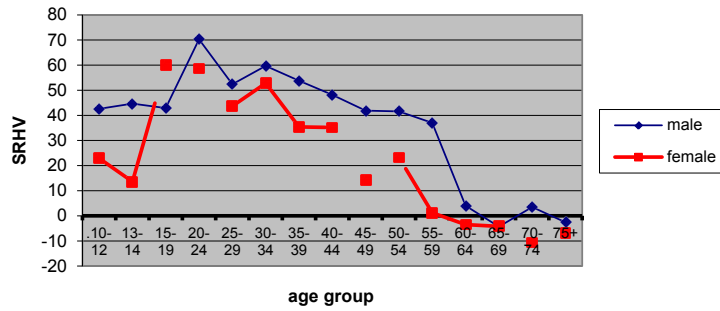
| Age Group | Current Self-rated Health Value (SRHV) | n | Rate the change in your health compared to last year | | | Annual Health Perception Variation Value (AHVV) (a+b) – (d+e) |
|---|---|---|---|---|---|---|
| | | | (a) Much better now than a year ago % +(b) Somewhat better now than a year ago % | (c) About the same as one year ago % | (d) Somewhat worse now than one year ago% +(e) Much worse now than one year ago% | |
| 10-12 | 32.3 | 421 | 64.8 | 24.0 | 11.2 | 53.6 |
| 13-14 | 29.5 | 647 | 59.4 | 27.5 | 13.1 | 46.3 |
| 15-19 | 53.7 | 109 | 36.7 | 56.9 | 6.4 | 30.3 |
| 20-24 | 62.0 | 222 | 25.2 | 60.8 | 14.0 | 11.2 |
| 25-29 | 45.2 | 281 | 19.9 | 59.8 | 20.3 | -0.4 |
| 30-34 | 55.7 | 228 | 21.1 | 62.7 | 16.2 | 4.1 |
| 35-39 | 42.2 | 206 | 17.5 | 57.8 | 24.8 | -7.3 |
| 40-44 | 39.0 | 182 | 24.7 | 49.5 | 25.8 | -1.1 |
| 45-49 | 24.3 | 156 | 16.1 | 53.5 | 30.3 | -14.2 |
| 50-54 | 29.9 | 134 | 22.4 | 53.7 | 23.9 | -1.5 |
| 55-59 | 14.1 | 128 | 17.2 | 43.0 | 39.8 | -21.6 |
| 60-64 | 0.0 | 89 | 18.0 | 29.2 | 52.8 | -34.8 |
| 65-69 | -4.4 | 183 | 13.1 | 59.0 | 27.9 | -14.8 |
| 70-74 | -5.6 | 160 | 11.3 | 55.6 | 33.1 | -21.8 |
| 75+ | -5.6 | 251 | 9.6 | 44.8 | 45.6 | -36.0 |
| Overall | 29.5 | 3397 | 32.3 | 45.4 | 22.3 | 10.0 |

*row percentage

Both Self-rated health Value (SRHV) and Annual Health Perception Variation Value (AHVV) worsen as person gets older **(Table 2).** The age where the curves of AHVV and SRHV hit (intersected) the zero axis was around ages of 40 and 60 respectively and this was similar for both sexes.**(Figure 1 and 2).**

Besides, the patterns of the SRHV and AHVV lines apparently differ from each other in regard to gender. SRHV line for men is superior to that of women for all ages **(Figure 1).** The obvious male superiority that was seen in SRHV for all ages. This was diminished in AHVV after the ages 35 and a slight female advantage was observed between the ages of 35 and 55.

One significant finding is that, Turkish adolescent girls stated their current health (i.e., SRHV) as worse than what boys stated for themselves. Girls also reported a progressively worse perceived health transition (i.e., AHVV) compared to that of boys **(Figures 1 and 2)**; especially at age interval 13-14 which can be regarded as the onset of adolescence. On the other hand, following this period (i.e., at age 15) a sharp increase is observed especially for SRHV in girls **(Figure 1).**

Male > Female (t=-7.35, p<0.001)
**Figure 1.** "Current Self-rated Health Value (SRHV) according to age and gender  (n=3394, Male= 38.6%)."
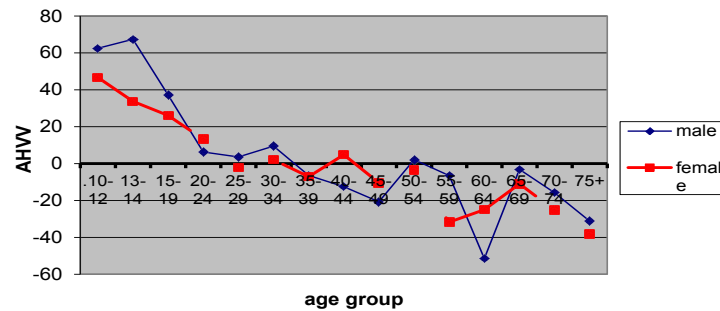


Male > Female (t=-7.55, p<0.001)
**Figure 2.** "Annual Health Perception Variation Value (AHVV) according to age and gender (n=3394, Male= 38.6%)."

As a measure of socioeconomic status (SES), "Perceived Income Level" was sensitive to both SRHV and AHVV for all ages **(Figure 3 and 4).** SRHV was more discriminative among income groups compared to that of AHVV. Another SES variable, "Employment status" of the family leader, also had an obvious effect on both of the indices SRHV and AHVV. As expected, unemployment caused significant decreases in both of the perceived health indices. Employment status differs from the perceived income variable in that, plots for employed and unemployed groups had a perfect accompaniment . In other words, the gap between both lines is uniformly almost the same for all ages **(Figure 5 and 6).**
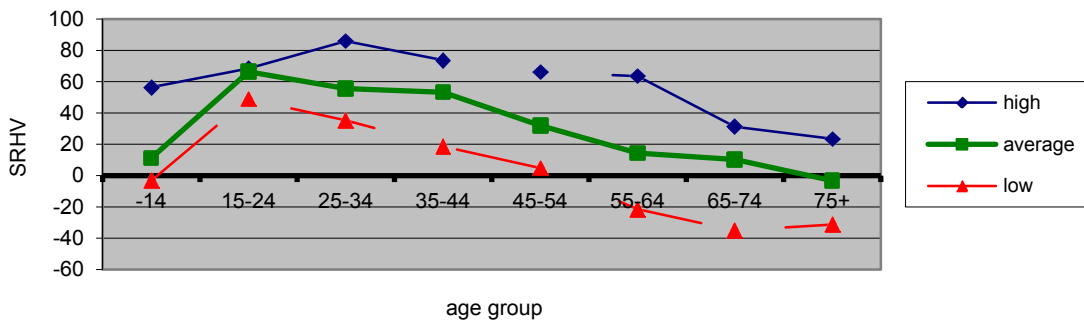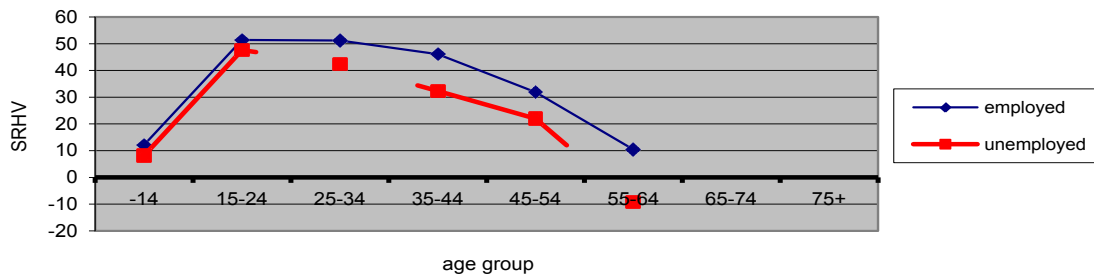


High>Average>Low (F=109.9, p<0.001)
**Figure 3.** "Current Self-rated Health Value (SRHV) according to age and perceived income level."
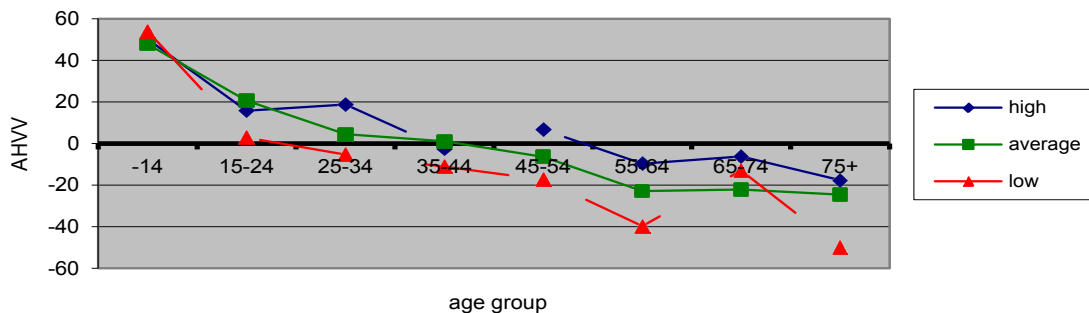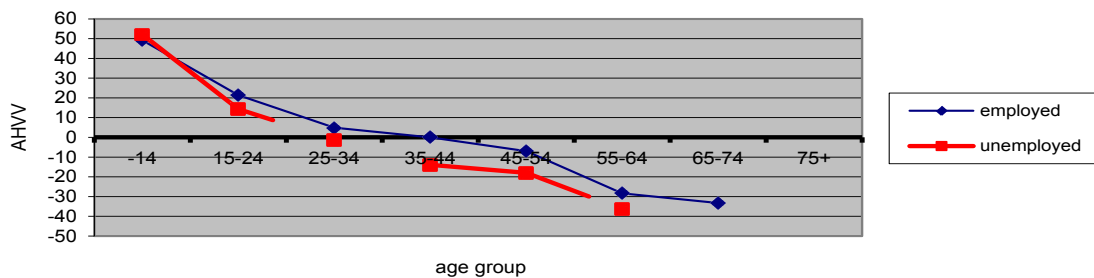


High>Average>Low (F=60.3, p<0.001)
**Figure 4.** "Annual Health Perception Variation Value (AHVV) according to age and perceived income level."

Employed > Unemployed (t=-2.77, p<0.001

**Figure 5.** "Current Self-rated Health Value (SRHV) according to age and employement status of the family leader."



Employed > Unemployed (t=-4.37, p<0.001)

**Figure 6.** "Annual Health perception Variation Value (AHVV) according age to and employment status of the family leader."

**Figure 7 and 8** shows the relationships between objective health status (i.e. having any diagnosed illness or not) and both SRHV and AHVV. Both indices decreased as a person gets older regardless of having any chronic disease. **Figure 9** shows direct comparison of the SRHV and AHVV. Except for the poor SRHV in the adolescent period, two lines show parallel trends.
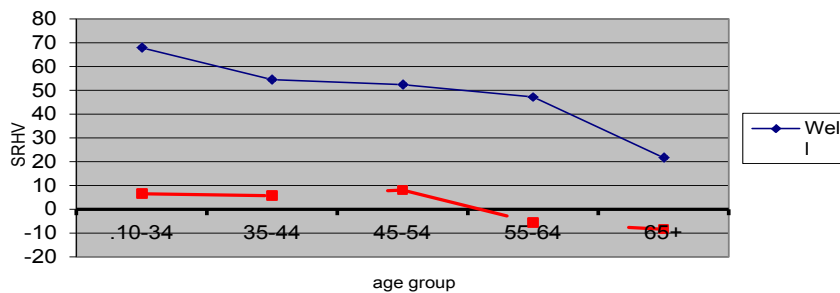


Well > Ill (t=-8.20, p<0.001)

**Figure 7.** "Current Self-rated Health Value (SRHV) according to age group and objective health status. (n=1476)."
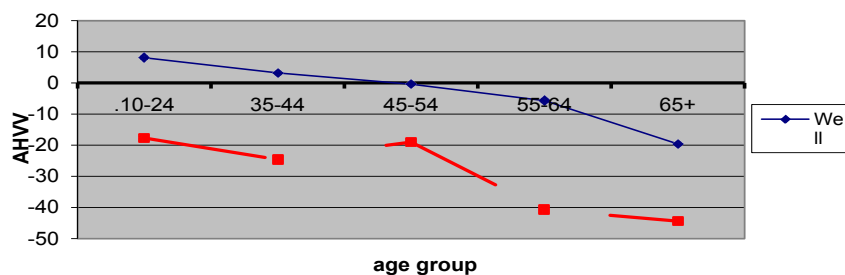


Well > Ill (t=-13.49, p<0.001)

**Figure 8.** "Annual Health perception Variation Value (AHVV) according to age and objective health status (n=1476)."
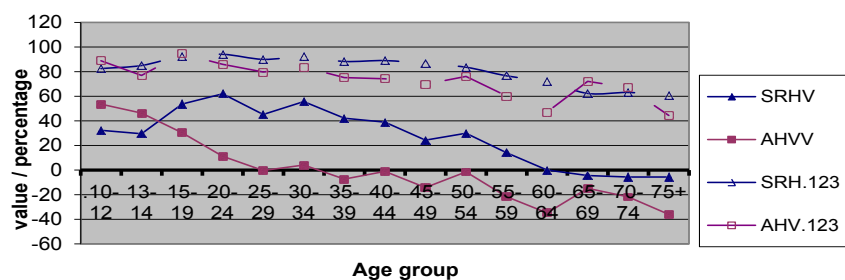


*SRHV= Self Rated Health Value; SRH123= The percentage of the collapsed first 3 response options
**AHVV= Annual Health Variation Value; AHV123= The percentage of the collapsed first 3 response options

**Figure 9.** "Comparison of the SRH* and AHV**."

**Table 3** shows the two Linear Regression models HTI and SRH as dependent variables each. Results of the analyses showed that HTI is affected by age (ß=0.36) more that that of SRHV (ß=0.08) whereas SRHV can be better explained by income level (ß=0.18) than AHVV (ß=0.05).

**Table 3 (a).** "Linear Regression of the raw Annual Health Transition Item (1-5) by age, gender, and level of income."

|  | Standardized Beta | p |
|---|---|---|
| Constant |  | 0.000 |
| Age | 0.358 | 0.000 |
| Gender | 0.072 | 0.000 |
| Perceived income level | 0.054 | 0.001 |
| Current Self-rated Health Item | 0.177 | 0.000 |

Dependent Variable: Health Transition Item score: $R^2$= 0.22

**Table 3 (b).** "Linear Regression of the raw Current Self-rated Health (1-5) by age, gender and level of income."

|  | Standardized Beta | P |
|---|---|---|
| Constant |  | 0.000 |
| Age | 0.084 | 0.000 |
| Gender | 0.082 | 0.000 |
| Perceived income level | 0.181 | 0.000 |
| HTI* | 0.197 | 0.000 |

Dependent Variable: Current Self-rated Health Item score: $R^2$= 0.13
*Health Transition Item

# DISCUSSION

All surveys that provide the data pool of this study are household based representative surveys expect the one school survey. Two of the studies were conducted just on the women population (household wives), one survey on the older adults population and one study on school children. The age and the distribution and gender balance of the pooled studies are acceptable except for the older adults' survey having a majority of the women.

Self Rated Health (SRH) is measured by a single question with ordinal response category. It is a simple, widely used method for the assessment of "subjective health status of an individual person". A considerable number of studies in the areas of "Health Related Quality of Life" and "Health Inequality" have also this single item. Self-Evaluated Health Transition Item of SF-36 has been suggested for the use and interpretation of self-evaluated subjective health transitions at the group level by Davies & Ware [16]. This item has five response categories ranging from "much better" to "much worse")

The purpose of this study is to demonstrate the use of Health Transition Item (HTI) in judging the population level health inequalities. A new "Subjective population level health index will be derived from the five point ordinal response scale of HTI. Annual Health Transition variation (AHVV) score was obtained by collapsing the two "better" and two "worse" option for each of the age groups as mentioned above in the methods section. And AHVV scores for each of the age groups were plotted in the graph. Although it is not always logical to collapse the first two and last two options for SRH item; a similar methodology was applied to the SRH item to calculate SRH Value. This was preferred to have consistency with the method used to derive AHVV

When we probe the mutual relationship of the SRH item and HTI, they both could explain any variation, or visa versa in the linear regression analyses as expected. But a very striking finding of the regression models was that HTI (the item we derive AHVV from) was more sensitive to "age" than does SRH. This means that the researchers should definitely control age when they use HTI in their health inequality research.

On the other hand, the plots showed that age trends of both of the indices were more or less the same with the exception of the different trend observed in the adolescent age groups. A decreasing trend that was observed in the AHVV for all ages starting at age 10 was not observed in the SRHV line **(Figure 9).** SRHV increases regularly beginning from the onset of adolescence till the end of the adolescence period (i.e., at age 20). A linear decreasing trend was also observed in SRHV. Different line patterns observed among SRHV and AHVV was interesting. Another interesting finding was the sharp decreasing trend for the AHVV till the end of age twenty. Annual average health changes decreases when the population reaches their thirties. This different trend was not observed in SRHV. No doubt these trends might be attributed to cultural and health services accessibility and the condition of the health determinants of the Turkish population. These findings on the adolescence period are in contrary with two recent studies indicating SRH is stable through the 4-year and 2-year observations [17,18]. This stability can also be seen in our results, especially after age 15. The percentage of the stable response (response option 3) on the age 15-19 is 56.9% which is consistent with the findings of the Breidablik's Young-HUNT study which is 58.7 % [17]. What makes our findings different than Young-HUNT study, is the low percentages (24% & 27.5%) observed in the stable response option (option 3) for the ages 10-14. An obvious instability was observed in SRH in Turkish young adolescents. AHVV value was between 46.3 - 53.8 on age interval 10-14 and 30.3 on 15-19 interval **(Table 2).** If we would use 4-year change figures of the Young-HUNT study to calculate a figure similar to AHVV, we could see that AHVV that we calculated for the Young-HUNT study would be as 11.1 for age interval 10-14 and as 4.5 on

age interval 15-17. This obvious difference between Turkish and Norwegian figures might be attributed to three potential reasons: first, the difference between two methods of calculating of AHVV; second difference between transition periods (1 year versus 4 years) and finally a real difference between adolescence populations in regard to SRH. This final possibility seems unrealistic since AHVV was also found sensitive to socioeconomic status, which is apparently better in Norway than Turkey.

In regards to gender affect on the SRHV and AHVV, we saw that for both indices, young women are significantly disadvantaged compared to young men. Female disadvantage for SRHV continues to decline regularly soon after the beginning of the adulthood. This subjective female disadvantage is a well known phenomenon and has been published in a number of studies [19,20]. Subjective beliefs-Perception of deterioration of self health has also been reported to be more common in girls in the Young-HUNT study, but this difference between genders became insignificant in the multivariate models. Unlike this study our data showed this gender difference (i.e. disavantage for females) remained to be significant in the multivariate models for both SRH and AHV **(Table 3).** An important characteristic that needs explanation here is the diminishing trend of gender difference after the onset of adulthood in the AHVV. Similarities between men and women in regard to SRH and AHV noted in our study is consistent with the results of Undén &Elofsson [21]. They concluded that "this similarity indicate that men and women interpret and/or value health-related factors similarly when making statements about health" If our sample size would be bigger enough to allow us to draw a more detailed plot for smaller age groups we would possibly have more strong opinion about this phenomenon.

Socioeconomic status tested by means of perceived income was found sensitive for both of the SRHV and AHVV. Both SRHV and AHVV may be confidently used in the social inequalities research. As for the income groups, both indices are sensitive to the objective health status of our sample **(Figures 7 and 8).** A discernible decreasing trend can be said for the AHVV line for those who reported any diagnosed chronic illness, whereas the same cannot be said for cannot be said for the SRHV line of the illness group.

This finding is also significant and shows promise for the application/ of AHVV during community level monitoring health services access for the chronically ill.

A link between overestimation of own health compared to objective health status was reported by Chipperfield [22]. In our study SRHV's were found to be 1.5 and 53.0 and AHVV's were -24.4 and 0.2 for ill and well persons respectively. The overestimation pointed out by Chipperfield is also true for SRH in our study [22].

When we look closely to the slope of the line and the "age groups" where the graph line crosses the horizontal zero line between socio economic groups. These "age groups" may serve the researchers a potential advantage for sub-group comparisons in regard to health inequalities. The slope of the line and the age that the graph line cross the horizontal zero line for AHVV for any population, would be different? Or we may ask the same question for the consecutive years for the same population? For example the plot line crosses horizontal "zero" line at about age 25 for low income / unemployed groups whereas crosses at about 35-44 age interval for middle-high income groups. And also regarding the whole study population, AHVV line crosses horizontal line at about 40ies. This crossing point may be different in any other populations indicating a reference for health inequality.

AHVV is developed by only retrospective health (change) perception of the persons in this study. The most important limitation of this study is the lack of data to confirm if this retrospective health evaluation is really what would be expected by means of also a prospective design similar to the other studies [17,18,23].

What would be the difference between retrospectively and prospectively obtained AHVVs? If we would conduct two annual consecutive SRH evaluations, obtain AHVV, and compare this prospective AHVV with that of obtained by retrospective (or cross-sectional) evaluation of the annual health transition as Juniper and Statford did with rather small samples on persons having chronic illness and Perneger and colleagues in their community based study [23-25]. Both quantitative and qualitative findings in the literature reported that global health transition items correlate highly with current SRH and do not correlate with prior (time 1) health state measurements [4,26,27]. These studies were based on individual data. If we would obtain close values between prospectively and retrospectively generated AHHVs then we would easily advocate retrospectively/ cross-sectional obtained AHVV (what we have done in this study).

## CONCLUSION

In conclusion, AHVV can be regarded as a new simple population level parametric summary health index. It shows promise for use in the community level health inequalities especially in the area of health service research. Further studies on the slope and the pattern of the AHVV line would promise valuable comparisons among different populations and time trends in the same population.

## REFERENCES

1. Huisman M, et al. The predictive ability of self-assessed health for mortality in different educational groups. International Journal of Epidemiology. 2007;36:1207–1213.

2. Singh-Manoux A, et al. Self-Rated Health and Mortality: Short- and Long-Term Associations in the Whitehall II Study. Psychosomatic Medicine. 2007;69:138–143.

3.  Wang C and Satariano WA. Self-rated current and future health independently predict subsequent mortality in an aging population. J Gerontol A Biol Sci Med Sci. 2007;62:1428-1434.

4.  Guyatt GH, et al. A critical look at transition ratings. J Clin Epidemiol. 2002;55:900–908.

5.  Guyatt GH, et al. Measuring health-related quality of life. Ann Intern Med. 1993;70:225-230.

6.  Veehof MM, et al. Comparison of internal and external responsiveness of the generic Medical Outcome Study Short Form-36 (SF-36) with disease-specific measures in rheumatoid arthritis. J Rheumatol. 2008;35:610-617.

7.  Zheng B. Measuring Health Inequality and Health Opportunity. Discussion paper 06-06. Department of Economics, University of Colorado at Denver, 2006.

8.  Abul Naga RH and Yalcin T. Inequality measurement for ordered response health data. J Health Econ. 2008;27:1614-1625.

9.  Mackenbach JP and Kunst AE. Measuring the magnitude of socio-economic inequalities in health: an overview of available measures illustrated with two examples from Europe. Soc Sci Med. 1997;44:757–771.

10. Allison RA and Foster J. Measuring health inequalities using qualitative data. Journal of Health Economics. 2004;23:505–524.

11. Eser E, et al. Derivation of response scales for Whoqol : The Effect of the level of education on the use of Visual Analogue Scales. European Psychologist. 2000;5:278-284.

12. Ergün U, et al. Trail of a new pain assessment tool in patients with low education: the full cup test. Int J Clin Pract. 2007;61:1692-1696.

13. Chachamovicha E, et al. Literacy affected ability to adequately discriminate among categories in multipoint Likert Scales. Journal of Clinical Epidemiology. 2009;62:3-46.

14. Williams SA and Swanson MS. The effect of reading ability and response formats on patients' abilities to respond to a patient satisfaction scale. J Contin Educ Nurs. 2001;32:60-67.

15. Ware JE, Snow KK, Kosinski M, Gandek B,et al. SF-36® Health Survey Manual and Interpretation Guide. Boston, MA: New England Medical Center, The Health Institute. 1993.

16. Davies AR and Ware JE. Measuring Health Perceptions in the Health Insurance Experiment. Santa Monica, CA: Rand Corporation,R-2711-HHS. (Health Insurance Experiment Series.) 1981.

17. Breidablik HJ, et al. Self-rated health during adolescence: stability and predictors of change (Young-HUNT study, Norway). Eur J Public Health. 2009;19:73-78.

18. Boardman JD. Self-rated health among U.S. adolescents. Journal of Adolescent Health. 2006;38:401-408.

19. Molarius A, et al. Socioeconomic conditions, lifestyle factors, and self-rated health among men and women in Sweden. European Journal of Public Health. 2007;17:125–133.

20. Denton M, et al. Gender differences in health: a Canadian study of the psychosocial, structural and behavioral determinants of health. Soc Sci Med. 2004;58:2585-2600.

21. Undén AL and Elofsson S. Do different factors explain self-rated health in men and women? Gend Med. 2006;3:295-308.

22. Chipperfield JG. Incongurence between health perceptions and health problems. J.Aging Haalth. 1993;5:475-496.

23. Perneger TV, et al. Prospective versus retrospective measurement of change in health status: community based study in Geneva, Switzerland. Journal of Epidemiology and Community Health. 1997;51:320-325.

24. Juniper EF, et al. Measuring quality of life in childhood asthma. Quality of Life Research 1996;5:35-46.

25. Stratford PW, et al. Health status measures: Strategies and analytical methods for assessing change scores. Phys Ther. 1996;76:1109-1123.

26. Wyrwich KW and Tardino VM. Understanding global transition assessments. Quality of Life Research. 2006;15:995–1004.

27. Norman GR, et al. Methodological problems in the retrospective computation of responsiveness to change: The lessons of Cronbach. J Clin Epidemiol. 1997;50:869–879.