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RESEARCH PAPER

Subjective Wellbeing and Homeostatically Protected Mood: Theory Validation With Adolescents

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Abstract Researchers generally agree that Subjective Wellbeing (SWB) comprises both cognitive and affective components. However, the proportioning of their contributions, and the relationship between these constructs and personality, remain equivocal. This study investigated the relationship between these constructs, representing affect by Homeostatically Protected Mood (HPMood). Using a sample of 205 Victorian high-school students aged between 13 and 20 years, structural equation modeling determined that an HPMood-driven model of SWB was better fitting than either a personality-driven model of SWB or a cognition-driven model of SWB, explaining 80% of variance. These results support HPMood as the major component of SWB. They also reinforce the proposition that HPMood may be the driving force behind individual SWB set-points and the variable that SWB homeostasis seeks to defend.

Keywords Subjective Wellbeing · HPMood · Homeostasis theory · Adolescents

Subjective Wellbeing (SWB) is commonly proposed to be a multi-faceted construct comprising emotional responses, domain-based satisfactions and global judgments of life satisfaction (e.g., Diener et al. 1999). Life satisfaction is measured through the question 'How satisfied are you with your life as a whole'? Domain-based satisfaction judgments refer to affective and cognitive evaluations to more specific, identifiable aspects of a person's life, such as satisfaction with health. SWB is commonly measured through the average of domain-based satisfaction judgments. While there is general agreement that SWB comprises both cognitive and affective components (e.g., Campbell et al. 1976; Diener and Diener 1996; Steel and Ones 2002; Veenhoven 1994), the relationship between

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these components is not well understood. However, recent findings by Davern et al. (2007) have suggested that SWB is dominated by affect, in a form called Homeostatically Protected Mood (HPMood; Cummins 2010) with cognitive discrepancies playing a significant but subsidiary role. This study will explore the relative contribution of affect and cognition to SWB to determine the robustness of Davern et al's findings using a sample of Victorian high-school age students.

1 Subjective Wellbeing Homeostasis Theory

Surveys conducted on the Australian population demonstrate remarkable stability in SWB. For example, surveys over the years 2001–2010, as part of the Australian Unity Wellbeing Index, show that the mean level of SWB across 22 surveys varies by just 3.0 percentage points (Cummins et al. 2010). Moreover, using these survey mean scores as data, their distribution indicates a normative range for SWB between 73.6 and 76.6 percentage points. Such consistency in SWB supports Cummins (1995, 2010) proposal that SWB is actively controlled and maintained by a set of psychological devices. By virtue of analogy to the physiological, homeostatic maintenance of bodily functions such as body temperature, Cummins refers to this management process as Subjective Wellbeing homeostasis.

SWB Homeostasis theory asserts that SWB is maintained by stabilizing forces such as adaptation, positive affectivity and a system of cognitive buffers. The buffer variables include positive cognitive biases of self-esteem (i.e. feelings of self worth) (Cummins and Nistico 2002), perceived control (i.e. perception that that one can achieve desired outcomes through their own actions) (Thompson et al. 1998) and optimism (i.e. the belief that one's future is bright despite what current life circumstances may suggest) (Peterson 2000). These buffers interact with experience from the environment, and, under normal, unthreatening conditions, SWB is maintained by the homeostatic system at a steady level within the normal range. When emotional responses challenge the maintenance of SWB, provided that the homeostatic resources are sufficiently strong, SWB will continue to be maintained within its normal range. However, when the strength of negative influences exceeds the homeostatic capacity to counter such challenge, the homeostatic system will forfeit control to the challenging agent, resulting in either a drop or a rise in SWB beyond its set-point-range (for an elaboration of these propositions see Cummins 2010).

2 Core Affect and Homeostatically Protected Mood

At the heart of SWB Homeostasis Theory is the construct of 'Homeostatically Protected Mood' (HPMood: Cummins 2010; Davern et al. 2007). HPMood is based on Russell's (2003) description of Core Affect, which he defined as a "neurophysiological state consciously accessible as the simplest raw (non-reflective) feelings evident in moods and emotion" (p. 148). It is further described as being consciously experienced, but not cognitive or reflective, as always present in the background, having no object or cause, and residing at the core of all emotion-laden events. In 2009, Russell revisited his earlier work on Core Affect and offered a description which is at odds with his earlier conception that core affect is not linked to emotional states. Here, Russell makes a distinction between a prototypical emotional episode that is "directed at something" (pp. 7) and core affect, which is "not necessarily directed at anything" (pp. 7). However, in this same paragraph, Russell states that core affect "can come to be directed at something". Thus, in contrast to his 2003 conception, Russell (2009) argues that core affect may itself be changed by a variety of influences. In response to this inconsistency, Cummins (2010) coined the term 'Homeostatically Protected Mood' to describe the mood state defended by homeostasis.

According to SWB Homeostasis Theory, HPMood not only constitutes the affective component of SWB, it also reflects the steady-state affective set-point that Homeostasis seeks to defend. Support was initially provided by Davern et al. (2007) who represented HPMood by the three affects of happy, contented and excited. They found these explained 64% of the variance in SWB, thus suggesting a dominant affective component to SWB. Cummins (2010) concludes that the process of evolution has advantaged the survival of individuals who experience a level of HPMood that corresponds with the hypothesized value of between 70 and 80 points pleasant or positive. This range is argued to represent the most adaptive level of HPMood and optimum set-point range for SWB.

In a further challenge to received wisdom regarding the relationship between SWB and personality, Davern et al. (2007) used Structural Equation Modeling to explore the relative strength of HPMood in three separate models incorporating cognition (measured according to Multiple Discrepancies Theory; MDT, Michalos 1985) and all five factors of personality (NEO Personality Inventory; Costa and McCrae 1992). All of their models confirmed that the relationship between SWB, HPMood and discrepancies is far stronger than that between personality and SWB. Their Affective-Cognitive model provided the best fit to the data, explaining 90 percent of the variance in SWB. This suggests that HPMood is the driving force behind SWB and not personality as is generally reported in the literature (e.g., DeNeve and Cooper 1998; Emmons and Diener (1985); Headey and Wearing 1989, 1992; Vitterso 2001; Vitterso and Nilsen 2002). According to Davern et al. the major implication of their findings is that HPMood may be driving the relationship between personality and SWB. Moreover, since HPMood is driving both personality and SWB, individual differences in set-point levels of HPMood may be causing personality and SWB to correlate. This is a likely reason why SWB and personality often appear so related.

A recent study by Blore et al. (2010) using a sample of 387 individuals who responded to the 5th longitudinal survey of the Australian Unity Wellbeing Index (see http://acqol.deakin.edu.au/index_wellbeing/index.htm) supports the findings of Davern et al. (2007). These authors determined, using structural equation modeling, that a purely affective model based on Russell's (2003) description of Core Affect, provided the best fit to the data and was the most parsimonious model explaining 66% of variance in SWB. Similar to Davern et al. these authors concluded that personality is not an important determinant of SWB, with Extroversion found to exert a near zero, non-significant effect; whilst emotional stability, although significant, was only weakly related to SWB in the presence of affect. Rather, their findings strongly support SWB as a construct driven by HPMood.

The study that follows aims to partially replicate Davern et al. (2007) using a sample of Australian high-school age students. It is hypothesized that their mean level of SWB will lie within the Australian adult normative range of 73.6–76.6 percentage points. It is also hypothesized that adjectives located on the 'Pleasant' and 'Activated' poles of the Circumplex Model of Affect (e.g., 'happy', 'content' and 'alert') will dominate and explain significant variance in SWB. Finally, it is hypothesized that an Affectively-driven model of SWB will offer the statistically preferred description of how the variables relate to one another when compared against a personality driven model and discrepancy driven model of SWB.

3 Methodology

3.1 Participants

The 205 participants were attending various high-schools in the Melbourne metropolitan region and country Victoria. This sample comprised 53 males (25.9%) and 152 females (74.1%), representing 2 students in year 7 (1.0%), 5 students in year 8 (2.4%), 6 students in year 9 (2.9%), 43 students in year 10 (21.0%), 49 students in year 11 (23.9%) and 100 students in year 12 (48.8%). Participants' ages ranged from 13 to 20 years, with a mean age of 16.7 years.

3.2 Questionnaire

A 67 item paper and pencil questionnaire was self-completed by each student, under conditions of information privacy, in their regular classroom. Four items obtained demographic information on age, sex, year level at school and post-code of residence; and the remainder of the questionnaire comprised scales measuring life satisfaction, Subjective Wellbeing, HPMood, school satisfaction, Extraversion, Emotional Stability, and Multiple Discrepancies Theory. It also included measures of self-esteem, optimism, and perceived control, but these variables are not used in this paper. Students responded to all scale items using 11 point, end-defined scales.

3.3 Major Dependent Variable and Other Variables

3.3.1 Life Satisfaction (LS) and Subjective Wellbeing (SWB)

The measure of life satisfaction (LS) is a single-item that asks 'How satisfied are you with your life as a whole' (0 = Very Dissatisfied; 5 = Neutral; 10 = Very Satisfied).

The Personal Wellbeing Index-School Children (PWI-SC; Cummins and Lau 2005) measures SWB and is a parallel version of the PWI-Adult (International Wellbeing Group 2006). It comprises seven items (domains) of satisfaction, selected to represent the first level deconstruction of satisfaction with 'life as a whole'. The wording of some domains differs from the adult in a way to make them easier to comprehend. For example, the PWI-A item 'How satisfied are you with your future security'? was re-worded to 'How satisfied are you about what may happen to you later on in your life? This study also included a new item on satisfaction with School (Tomyn and Cummins 2010). The manual for the adult version of this scale reports good internal reliability as Cronbach's α between .70 and .85. In the present study it was .85.

3.3.2 Homeostatically Protected Mood (HPMood)

This was measured by three affective adjectives as 'Happy', 'Content' and 'Alert'. Participants responded to each item as follows:

'Please indicate how each of the following describes your feelings when you think about your life in general?: How… (insert affective adjective)… do you generally feel?' (0 = Not At All; 10-extremely). Chronbach's alpha for these three affect items was high (Cronbach's $\alpha = .82$) and a single composite variable was computed.

3.3.3 Personality

The personality dimensions of extraversion and neuroticism were measured using four items from the Ten-Item-Personality-Inventory (TIPI; Gosling et al. 2003). Two items measuring each of the personality dimensions of extraversion and neuroticism (reverse coded as emotional stability) were included since these are the two personality constructs most related to Subjective Wellbeing (DeNeve and Cooper 1998). Being mindful of student motivation to complete the survey, the TIPI was chosen because it is a brief measure and suitable for use with children.

3.3.4 Multiple Discrepancies Theory

MDT was assessed using 7 items adapted from Michalos' (1985) original scale. Although modified for the purpose of improving comprehension amongst school age children, items still retained the essence of the original. For example, the original item 'Considering your life as a whole, how does it measure up to the average for most people your own age and sex in this area. Generally, does your life offer you far less than what is offered the average person, more, etc.?' was shortened to 'How does your life compare to the average for most people your own age?' (0 = Far below average; 5 = About average; 10 = Far above average). Reliability for the modified version of Michalos' scale was high (Cronbach's $\alpha = .85$) and a composite variable was computed.

3.3.5 Procedure

After obtaining approval from the Deakin University Ethics Committee (project reference number: EC 261-2005), approval was sought from the Department of Education and Training and The Catholic Education Office. Approval from these organisations must be obtained prior to conducting research in government and Catholic high-schools.

Once these authorities had given their approval, various high schools in the Melbourne metropolitan region and country Victoria were contacted either by phone or e-mail. A representative from each school was briefed on the proposed study, its aims, obligations as a participating school, and responsibilities of the researcher. Of the 14 schools contacted, four agreed to take part in the study.

Following approval by school authorities, potential research participants were handed parent/guardian consent forms. Students who returned signed forms were then handed participant consent forms and, at the time of distribution, were informed as to the nature of the study. These included their obligations as a participant (such as time commitments), the procedure for returning the anonymous questionnaires upon completion, and their right to withdraw their participation at any time.

Each student who volunteered to participate then received an envelope containing a plain language statement and a questionnaire. Participants were given time in class to complete their questionnaire, seal it in the envelope provided, and return it to either the first author or the classroom teacher (whoever was present). In the latter situation, questionnaires were mailed by the teacher to Deakin University. Upon completion of the study, participants had the opportunity for debriefing and to obtain a copy of the results.

3.4 Data Analytic Strategy

In addition to multiple regression analysis, data were analysed using Structural Equation Modelling (SEM) in Amos (7.0, 2006). When assessing how well a structural equation model fit the data, it is important to highlight the inappropriate reliance on the chi-square statistic Kline (1998). Chi-square is a measure of the discrepancy between the saturated (best-fitting) model and the model being tested. Accompanying the chi-square statistic is a p value that indicates significance of difference between a model and the data—if $p > .05$, then model and data are not significantly different from one another, indicating a close fit.

While the present sample of 205 cases meets the requirement for adequate sample size (to be discussed in the results section), according to Kline (1998) chi-square is overly sensitive to sample size and as a result, large sample sizes may reach significance even when there is only a small discrepancy between data and model. One technique that reduces sensitivity of the chi-square statistic is to divide chi-square by degrees of freedom (χ^2/df). Ideally, χ^2/df should not be greater than 3.0, indicating model parsimony. Once calculated, χ^2/df can be interpreted alongside absolute and incremental fit indices. Kline further adds that the fit statistics chosen for interpretation will vary from researcher to researcher, however, the author encourages the presentation of a minimal set that includes: (χ^2/df); an index describing overall proportion of explained variance (e.g., Squared Multiple Correlation; SMC); an index based on standardised residuals (e.g., Root Mean Squared Error of Approximation; RMSEA); and an index detailing the discrepancy between the saturated (best-fitting) and independence model (e.g., Normed Fit Index; NFI). A RMSEA value of .05 or less would indicate a close fit of the model in relation to the degrees of freedom. Furthermore, the value for NFI should approximate 1.0, indicating little or no difference between the best-fitting model and independence model; however, an NFI $> .90$ is acceptable.

These criteria will be adopted in the analyses to follow. Finally, the Akaike Information Criterion (AIC) will be used to assess the complexity of the specified models. The AIC is a modification of standard goodness-of-fit statistic (chi-square) that includes a penalty for complexity (Kline 1998). According to Kline, AIC is analogous to indexes of model fit; and the AIC for a model is computed using the following formula: AIC $= \chi^2 - 2df$. Thus, complex models (with fewer degrees of freedom) undergo larger reductions in their χ^2 values. Lower AIC values are preferred as these represent more parsimonious models.

It should be noted that while model fit indices are an important indicator of how well a model fits the data, model fit statistics should be interpreted with caution. According to Thompson (2004), before conclusions regarding the relative strength of fit between models can be made, the researcher must test plausible alternatives. Thompson further adds that if after testing, the preferred model is the one with the most adequate fit, stronger conclusions regarding the models efficacy over another can be made. Thus, in this study, a number of competing models of SWB will be tested to determine which theory offers the relatively best description of how the variables relate to one another.

4 Results

4.1 Data Screening and Preliminary Analyses

SPSS software (version 17.0, 2008) was used for data screening and analysis. To standardise data, all reported values have been converted to a Percentage of Scale Maximum (%SM) which converts data onto a 0–100 scale. %SM is calculated through the formula presented in the PWI Manual as:

$$\frac{X - k^{min}}{k^{max} - k^{min}} \times 100$$

X = the score or mean to be converted, k^{min} = the minimum score possible on the scale, k^{max} = the maximum score possible on the scale.

SPSS frequency output revealed that the frequency of missing data for all variables across the entire data set was less than 5%. As recommended by Tabachnick and Fidell (2001), given that missing data appeared random, values were replaced by regression, a more sophisticated technique for replacing missing values than mean substitution.

Examination of z-scores and scatter plots revealed univariate outliers on domain satisfaction variables (with the exception of satisfaction with health) and HPMood items (with the exception of 'alert'). However, comparison of mean scores on these variables with corresponding means trimmed at the upper and lower 5% revealed that none of these outliers significantly influenced mean scores on key variables. As a consequence, univariate outliers were included in analyses (Pallant 2001). No multivariate outliers were identified with a Mahalanobis distance greater than 16.266 (critical $x^2 = 16.266$, $p < .001$), a criterion recommended by Tabachnick and Fidell (2001) for the corresponding degrees of freedom ($df = 3$).

According to Cohen and Cohen (1983), skewness and kurtosis are acceptable within the range of −7.0–7.0. Thus, no variables underwent transformation.

All major composite variables, including LS, SWB, HPMood, personality and MDT were tested for multicollinearity and singularity. The highest observed correlation was between the variables 'happy' and 'content' ($r = .86$). Tabachnick and Fidell (2001) suggest that a researcher should think carefully before including two variables with a bivariate correlation of greater than .70 due to risk of inflated correlations between these variables. However, it was expected that some affect adjectives would correlate highly due to shared HPMood. According to theory, due to the abstract nature of questioning, HPMood will have a profound influence over responses to items such as 'How happy/content do you generally feel'. Thus, inflated correlations between these items can be attributed to shared variability in HPMood. Given that one aim of this research is to examine the affective nature of SWB, it is necessary to include both 'content' and 'happy' in analyses so that it can be precisely determined which affect terms contribute significant variance to the prediction of SWB. Based on this reasoning, all items and composite scores were retained.

Finally, this study met the sample size requirement for multiple regression analysis according to Tabachnick and Fidell (2001) and that for structural equation modelling as specified by Loehlin (1987, 1992).

4.2 Results

Confirming the first hypothesis, and consistent with SWB Homeostasis Theory and Australian adult normative data, the mean SWB for this sample (73.61, SD = 14.18) is just within the adult normative range of between 73.6 and 76.6 percentage points (Cummins et al. 2010).

The second hypothesis states that the adjectives comprising HPMood (happy, content and alert) will dominate the explained variance in SWB. This was tested using hierarchical multiple regression. Table 1 displays Means, standard deviations and correlations between variables. The results are presented in Table 2 and include variances explained, standardized regression coefficients and squared semi-partial correlations. In multiple regression, sr (semi-partial correlation) expresses the unique correlation between an IV and a DV when the influence of other IV's in the model are removed. It is, thus, a very useful measure of the importance of a predictor. In SPSS, sr values are provided in SPSS output under the column 'part' and, when squared, provide the unique contribution of an IV to the total variance of a DV.

The $\underline{R}$ for this model was significantly different from zero, $F(3, 201) = 88.494$, $p < .001$. It can be seen that each of the affects makes a significant contribution to accounting for the variance in SWB, with a total 57% of variance being so explained. Interestingly, only 9% of variance explained is unique, indicating that HPMood may be the cohesive force causing much of the variance explained to be shared between these three adjectives.

Table 1 Means, standard deviations and correlations between variables

Variable	Mean	SD	1.	2.	3.	4.
1. SWB	73.61	14.18	–			
2. Happy	69.61	19.70	.70	–		
3. Content	68.63	19.10	.71	.86	–	
4. Alert	64.68	18.24	.51	.44	.49	–

* All correlations are significant at $p < .001$

Table 2 Predicting SWB using HPMood

	R^2	Adj. R^2	ΔR^2	β	sr^2
Step 1					
Content				.71***	.51
	.51	.51			
Step 2					
Content				.61***	.28
Alert				.21***	.03
	.54	.54	.03***		
	Unique variance = 31.0%				
	Shared variance = 23.0%				
Step 3					
Content				.34***	.03
Alert				.20***	.03
Happy				.32***	.03
	.57	.57	.03***		
	Unique variance = 9.0%				
	Shared variance = 48.0%				

* $p < .05$; ** $p < .01$; *** $p < .001$

4.3 Model Testing

The purpose of the following structural equation models is to explore which theoretical model fit the data best. Using AMOS and maximum likelihood estimation, the models being examined are similar to Davern, et al. (2007). These include:

1. An Affective model
2. A Personality-driven model
3. A Multiple Discrepancies model

The Affective model of SWB to be tested is shown in Fig. 1.

As shown in Fig. 1, HPMood is proposed to have a direct influence on SWB, personality and MDT. Direct paths are also specified between personality and SWB and between MDT and SWB to determine the influence of these constructs on SWB in the presence of HPMood.

4.3.1 Model 1: An Affective Model of SWB

In the final model, co-variances were fitted between error terms and these are theoretically justified. For example, error terms were fitted between interrelated SWB domains with moderate to high correlations. These included: *standard of living* and *future security* ($r = .48$), *standard of living* and *health* ($r = .49$), *health* and *future security* ($r = .50$), *health* and *achieving* ($r = .55$), *achieving* and *future security* ($r = .60$), *relationships* and *community* ($r = .52$) and *community* and *future security* ($r = .50$). Co-variances were also fitted between interrelated MDT error terms. These included: *self-wants* and *self-deserves* ($r = .46$), *self-wants* and *self-others* ($r = .70$), *self-wants* and *self-needs* ($r = .52$), *self-others* and *self-deserves* ($r = .64$), *self-others* and *self-needs* ($r = .59$), *self-deserves* and *self-needs* ($r = .59$) and *self-progress* and *self-best* ($r = .64$). It is important to note that while it is clear that these constructs are related, they are not multi-collinear. For example, the greatest correlation between interrelated domain satisfactions and discrepancy judgments was observed between *self-wants* and *self-others* ($r_{\text{self-wants} \leftrightarrow \text{self-others}} = 0.70$), while the latent constructs HPMood and SWB correlated at .88. According to Tabachnick

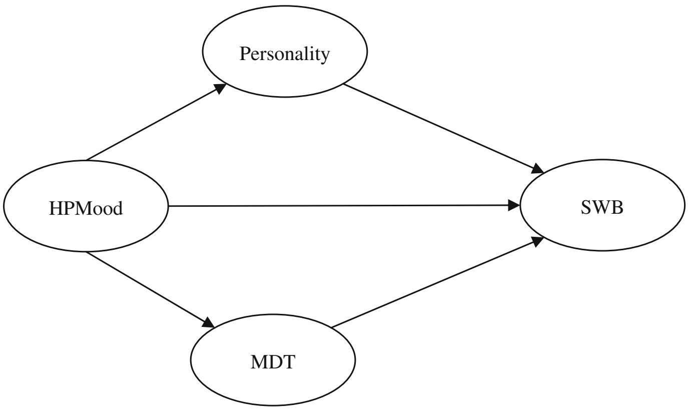

Fig. 1 The Affective model of SWB

and Fidell (2001), multicollinearity occurs when two variables share a zero-order correlation greater than 0.9. Thus, no variables in the model are collinear.

Although the χ^2/df for the Affectively-driven model is less than 3.00 ($\chi^2/df = 1.824$), indicating an acceptable level of model fit, the value for χ^2 is significant ($\chi^2 = 242.61$, $p = .000$) and this suggests that the model's covariance structure is significantly different from the observed covariance matrix. The other fit Indices for this model are presented in Table 3.

An SMC of .80 indicates that 80% of the variance in SWB is explained by the Affectively-driven model; an NFI of .88 is just below acceptability and indicates a need to re-specify the model; and an RMSEA of .064 is greater than .05, suggesting that the model is not a particularly close fit in relation to the degrees of freedom. However, an AIC value of 356.61 is less than that of the saturated model, suggesting that this is a relatively parsimonious model.

Despite explaining a considerable 80% of the variance in SWB, 61% of the variance in MDT and 27 and 25% of the variance in Extraversion and Emotional Stability respectively, results suggest that the Affectively-driven model does not fit the data particularly well. A path model specified according to the Affective model is presented in Fig. 2. In this figure, the standardised regression paths and SMC's (in italics) are provided.

As can be seen in Fig. 2, all pathways leading from HPMood are significant. HPMood is a powerful predictor of SWB ($\beta = .69$), MDT ($\beta = .78$), emotional stability ($\beta = .50$) and extraversion ($\beta = .52$). Interestingly, in the presence of HPMood, neither MDT nor extraversion predicts SWB. However, emotional stability contributes unique, significant variance ($\beta = .12$). Table 4 provides a summary of standardised regression coefficients and associated significance values for the variables in this model.

The results presented in Table 4 emphasise HPMood as the most dominant influence over SWB. Not only does HPMood contribute a standardized regression coefficient over four times that contributed by MDT, it significantly predicts MDT and personality. This suggests that these constructs are highly affective in nature. Consistent with this assumption, MDT has a non-significant effect on SWB in the presence of HPMood, suggesting that the relationship MDT shares with SWB may be driven by the relationship MDT shares with HPMood.

Overall, according to model fit statistics, the Affectively-driven model does not fit the data particularly well and suggest that the model can be improved.

4.3.2 A Personality-driven Model of SWB

This next SEM examines how well a Personality-driven model of SWB fit the data. The χ^2/df is 2.53, indicating an acceptable level of model fit. However, the value for χ^2 is significant ($\chi^2 = 334.29$, $p = .000$) and this suggests that the models covariance structure is significantly different from the observed covariance matrix. The other fit indices for this model are presented in Table 5.

Table 3 Absolute and relative fit Indices for the Affectively-driven model of SWB

χ^2	*df*	χ^2/df	P	AIC	NFI	RMSEA	SMC
242.61	133	1.824	.000	356.61	.88	.064	.80

NFI Normed Fit Index, *AIC* Akaike Information Criterion, *RMSEA* Root Mean Square Error of Approximation, *SMC* Squared Multiple Correlation

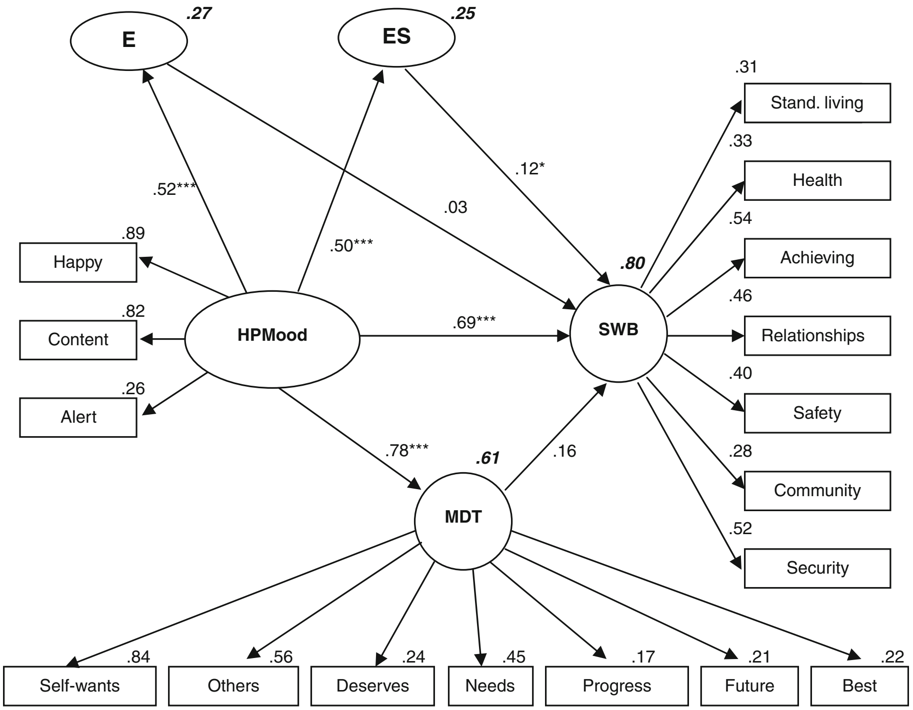

Fig. 2 Affectively-driven model of SWB. *$p < .05$; **$p < .01$; ***$p < .001$, *E* extraversion, *ES* Emotional Stability, *MDT* Multiple Discrepancies Theory, *SWB* Subjective Wellbeing

Table 4 Analysis of the Affectively-driven model of SWB

Pathways	β	p
HPMood → SWB	.69	.000
HPMood → MDT	.78	.000
HPMood → Emotional Stability	.50	.000
HPMood → Extraversion	.52	.000
MDT → SWB	.16	.123
Emotional Stability → SWB	.12	.041
Extraversion → SWB	.03	.680

Table 5 Absolute and relative fit Indices for the Personality-Driven model of SWB

χ^2	*df*	χ^2/df	P	AIC	NFI	RMSEA	SMC
334.29	132	2.53	.000	450.29	.84	.09	.78

NFI Normed Fit Index, *AIC* Akaike Information Criterion, *RMSEA* Root Mean Square Error of Approximation, *SMC* Squared Multiple Correlation

An SMC of .78 indicates that 78% of the variance in SWB is explained by the Personality-driven model of SWB; an NFI of .84 is below acceptability and indicates a need to respecify the model; and an RMSEA of .09 is greater than .05, suggesting that the model is not a close fit in relation to the degrees of freedom. Finally, an AIC value of 450.29 for the model is greater than that of the saturated model, suggesting that the personality driven model lacks parsimony. The comparison between these models is presented later.

The path model specified according to the Personality-driven model is presented in Fig. 3.

As can be seen in Fig. 3, the pathways between emotional stability and SWB ($\beta = .10$) and between extraversion and SWB ($\beta = .00$) are not significant. However, both emotional stability and extraversion predict HPMood ($\beta = .39$ and .44 respectively) and MDT ($\beta = .47$ and .31 respectively). More importantly, however, the path between HPMood and SWB ($\beta = .72$) remains strong and significant. Finally, a significant path between MDT and SWB ($\beta = .25$) suggests a unique contribution from MDT. Taken together, these results indicate that HPMood is the most dominant influence over SWB, with MDT again playing a significant, yet subsidiary role. Furthermore, when HPMood and MDT mediate

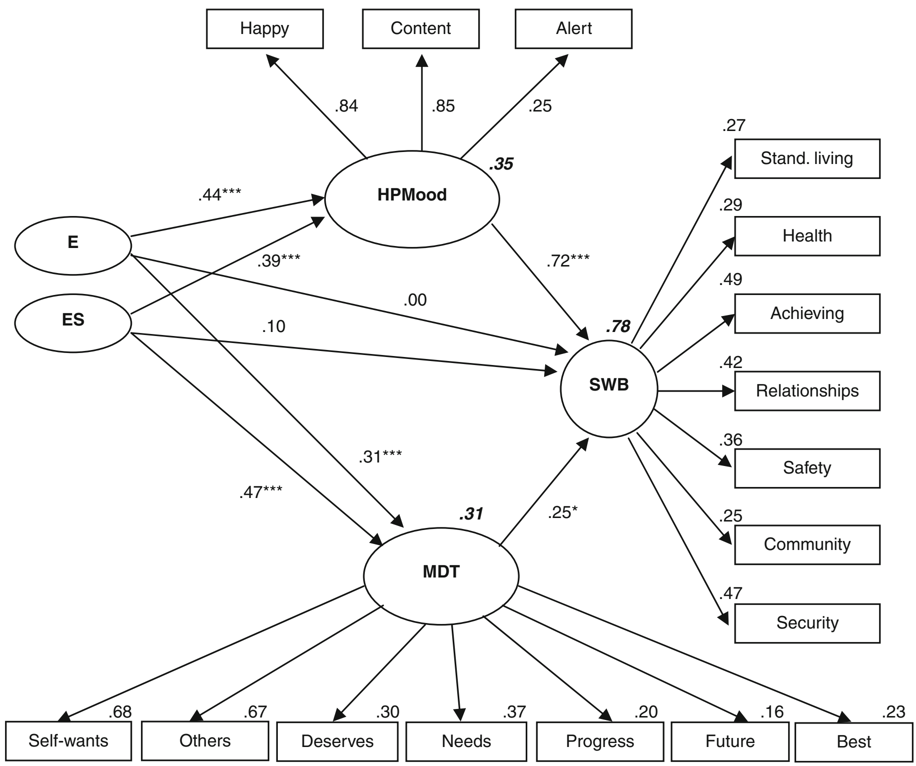

Fig. 3 SEM of a Personality-driven model of SWB. *$p < .05$; **$p < .01$; ***$p < .001$. *HPMood* Homeostatically Protected Mood, *E* extraversion, *ES* Emotional Stability, *MDT* Multiple Discrepancies Theory, *SWB* Subjective Wellbeing

the relationship between personality and SWB, the influence of personality on SWB in not statistically significant.

Table 6 provides a summary of standardised regression coefficients and associated significance values for variables in this model.

Results presented in Table 6 emphasise HPMood as the most dominant influence over SWB in this model. In fact, HPMood contributed a standardised regression coefficient over seven times that contributed by personality and over 2 and a half times that contributed by MDT, further suggesting its dominance over these constructs.

Overall, despite explaining 78% variance, according to model fit statistics, the Personality-driven model is a poor fit to the data.

4.3.3 Multiple Discrepancies Theory Model of SWB

Similar to the previous analyses, co-variances were included in this model. The χ^2/df for this model was 1.971 and indicates an acceptable level of model fit. However, the value for the chi-square statistic is significant ($\chi^2 = 262.11$, $p = .000$) and this suggests that the model's covariance structure is significantly different from the observed covariance matrix. The other fit indices for this model are presented in Table 7.

Fit indices presented in Table 7 suggest an average fit of the model to the data. An SMC of .80 indicates that 80% of the variance in SWB is explained by the model specified according to MDT; an NFI of .87 is below acceptability and indicates a need to respecify the model; and an RMSEA of .07 is above .05, suggesting that the model is not a particularly close fit in relation to the degrees of freedom. However, an AIC value of 376.11 for the model is less than that of the saturated or best fitting model, suggesting that this is a relatively parsimonious model. A path model specified according to MDT is presented in Fig. 4.

As can be seen in Fig. 4, not all pathways leading from MDT are significant. While MDT predicts HPMood ($\beta = .82$), extraversion ($\beta = .45$), and emotional stability ($\beta = .54$), MDT fails to significantly predict SWB when the relationship between these variables is

Table 6 Analysis of a personality-driven model of SWB

Pathways	β	p
Emotional Stability → SWB	.10	.143
Extraversion → SWB	.00	.974
Emotional Stability → HPMood	.39	.000
Extraversion → HPMood	.44	.000
Emotional Stability → MDT	.47	.000
Extraversion → MDT	.31	.000
MDT → SWB	.25	.014
HPMood → SWB	.72	.000

Table 7 Absolute and relative fit indices for MDT model of SWB

χ^2	df	χ^2/df	P	AIC	NFI	RMSEA	SMC
262.11	133	1.971	.000	376.11	.87	.07	.80

NFI Normed Fit Index, *AIC* Akaike Information Criterion, *RMSEA* Root Mean Square Error of Approximation, *SMC* Squared Multiple Correlation

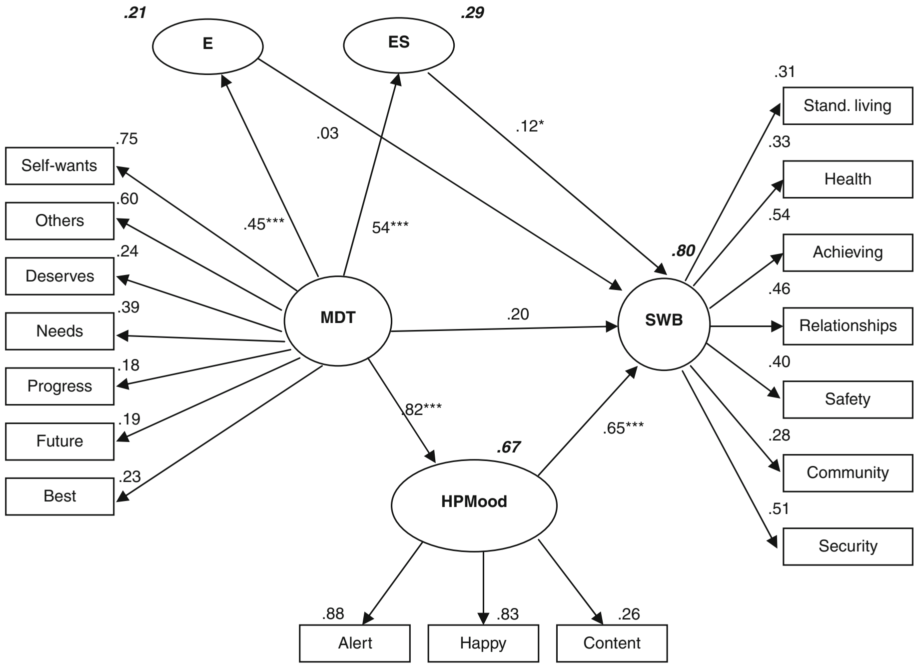

Fig. 4 Multiple Discrepancies Theory model of SWB, $*p < .05$; $**p < .01$; $***p < .001$, *HPMood* Homeostatically Protected Mood, *E* Extraversion, *ES* Emotional Stability, *MDT* Multiple Discrepancies Theory, *SWB* Subjective Wellbeing

mediated by HPMood and personality. Consistent with the Affectively-driven model and the Personality-driven model of SWB, the path between HPMood and SWB remains strong and significant ($\beta = .65$). From these results, it is apparent yet again that HPMood is the most dominant influence on SWB, with emotional stability ($\beta = .12$) playing a significant, yet subsidiary role in this model.

Table 8 provides a summary of standardised regression coefficients and associated significance values for variables in this model.

Results presented in Table 8 indicate that HPMood contributed a standardized regression coefficient over three times greater than that contributed by MDT. In contrast, MDT did not predict SWB. Thus, data again emphasise HPMood as the most dominant influence over SWB.

In summary, despite explaining 80% variance, model fit statistics indicate that the Personality-driven model of SWB does not provide a good fit to the data.

4.4 A Comparison of the SEM models

A summary of the fit statistics for each model are presented in Table 9. The models have been ranked from the relatively best fitting model to the worst fitting model.

The fit statistics in Table 9 indicate that the Affectively-driven model shown in Fig. 2 is the preferred description of how these variables are interacting with one another relative to the other models tested. While all the models had significant values for chi-square, that for the Affectively-driven model was lowest. The Affectively-driven model also ranked ahead

Table 8 Analysis of a multiple discrepancies model of SWB

Pathways	β	p
MDT → SWB	.20	.121
MDT → HPMood	.82	.000
MDT → Extraversion	.45	.000
MDT → Emotional Stability	.54	.000
Extraversion → SWB	.03	.560
Emotional Stability → SWB	.12	.049
HPMood → SWB	.65	.000

Table 9 Summary of absolute and relative fit indices for all models

Model	χ^2	df	χ^2/df	P	AIC	NFI	RMSEA	SMC
Affective	242.61	133	1.824	.000	356.61	.88	.06	.80
MDT	262.11	133	1.971	.000	376.11	.87	.07	.80
Personality	334.29	132	2.53	.000	450.29	.84	.09	.78

of the other two competing models on all other fit statistics. Importantly, the Affectively-driven model had the lowest AIC value, indicating that this is the most parsimonious of all three models tested.

Turning now to the specific models of SWB, it was consistently demonstrated that HPMood was the strongest single predictor in all three models, contributing standardised regression coefficients of between two-and-a-half and seven times greater than any other construct. In further support of the dominance of HPMood, regression coefficients between personality and SWB (in the Personality-driven model) and between MDT and SWB (in the MDT model) were non-significant when HPMood mediated these relationships. Thus, the relationship between these variables and SWB appears dependent upon shared variance with HPMood.

In summary, in support of the second hypothesis and consistent with Davern et al. (2007), the Affectively-driven model presented in Fig. 2 is the statistically preferred description of how the variables relate to one another, explaining 80% of the variance in SWB.

5 Discussion

The major aim of this study was to replicate the findings of Davern, et al. (2007) and Blore et al. (2010), that SWB is primarily an affective construct. Additionally, this study sought to partially replicate Davern et al's., finding that SWB shares the strongest relationship with adjectives defining HPMood, namely ‘happy’, ‘content’ and ‘alert’/’excited’. Finally, consistent with SWB Homeostasis Theory and Australian adult normative statistics, this study sought to determine whether the mean SWB score in this sample of adolescents would be contained within the Australian adult normative range of between 73.6 and 76.6 percentage points (Cummins et al. 2010).

Consistent with Australian adult normative statistics, the mean score for SWB (73.61%) was just within the Australian adult normative range. This finding supports SWB Homeostasis Theory which contends that in normal populations, SWB is actively controlled and maintained within a narrow 'set-point' range of values (e.g., Cummins 1995; Cummins and Nistico 2002).

Consistent with hypothesis two, the adjectives happy (pleasant), content (pleasant) and alert (activated) were found to be independent, significant predictors of SWB, explaining 57% of the variance in SWB. This finding is consistent with Davern et al. who found that SWB is primarily driven by affects representing the pleasantness-unpleasantness axes and activation-deactivation axes of the Circumplex Model of Affect. The implication of this finding is that HPMood, defined by these three affects, dominates the variance in SWB.

Finally, the aim of the structural equation models was to determine which theoretical model fit the data best. Models being tested were an Affectively-driven model similar to Blore et al. (2010), a Personality-driven model and a cognitive model specified according to multiple discrepancies (Michalos, 1985). Consistent with Davern et al. (2007) and Blore et al. 2010 according to model fit statistics, the Affectively-driven model was the best fitting. It is particularly interesting to note that the model fit statistics indicated a particularly poor fit for the Personality-driven model. This challenges a large body of research which implies that personality drives SWB (e.g., DeNeve and Cooper 1998; Emmons and Diener 1985; Headey and Wearing 1989, 1992; Vitterso 2001; Vitterso and Nilsen 2002). These current results indicate that most of the relationship between personality and SWB may caused by the common element of HPMood. A similar conclusion is made in respect of MDT. Taken together, these results overwhelmingly support HPMood as the major component of SWB and suggest that the strength of the relationship between personality and SWB and between MDT and SWB should be revisited in the presence of suitable affective controls.

A limitation of this study is that the sample of adolescents was a convenience sample and cannot be considered normative. The skew toward female respondents highlights this important consideration and raises the issue of whether gender differences in responding to questions of satisfaction may exist amongst adolescents. The most recent adult data obtained as part of the Australian Unity Wellbeing Index (Cummins et al. 2010) reveals that male and female SWB scores do not reliably differ significantly from one another. Whether this translates to adolescent data is yet to be fully explored in the SWB literature. A recent study by Tomyn and Cummins (2010), involving Australian adult and adolescent SWB data, did find that female adolescents have significantly higher levels of SWB than their male counterparts. However, the sample was skewed toward younger female respondents, and an age-related decline in SWB from early to mid adolescence was also found. Thus, it remains unclear whether this difference represents an actual difference between the genders or is an artifact of the sampling procedure. Future research will need to address these important issues with more representative samples of Australian high-school children.

In summary, this study supports previous research suggesting that SWB is primarily an affective construct and reinforces the central role of HPMood in explaining the construction of SWB. The results also suggest that similar relationships are evident between SWB, personality, MDT and HPMood in children as in adults. This supports the robustness of SWB Homeostasis Theory across the lifespan.

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