

Emotional Bond and Life Satisfaction with Age: A Correlational Study Based on National Health Survey

By CICI LIU AND PATTY LI

Life satisfaction is an overall cognitive evaluation of life. For decades, psychologists have identified it as one of the main components of happiness (Andrews & McKennell, 1980) and of subjective well-being with the emotional factor (Gilman & Huebner, 2003). These theoretical findings suggested that high life satisfaction was linked to positive physical and mental conditions. In parallel to the investigation of the nature of life satisfaction under theoretical frameworks, many empirical studies have explored factors that influence life satisfaction. For example, Palmore and Luikart (1972) proposed physical health and activity as a main factor; Lim and Park (2017) investigated the effects of socioeconomic status, emotional support, and career status. Among them, the relationship between emotional support and life satisfaction may not be straightforward in the first place. Although developing relationships with others has been deemed to restore mental wellness and alleviate emotional problems (Umberson & Montez, 2010; Greenman & Johnson, 2022), it is a separate topic regarding how emotional bonds correlate with the long-term cognitive evaluation of life.

Not surprisingly, psychologists have shown interest in investigating the relationship between emotional connection and life satisfaction. Karreman and Vingerhoets (2012) suggested that secure emotional connections promoted life satisfaction. Nanu (2015) echoed the idea and took one step further by showing that emotional connection was significantly positively correlated with self-esteem and emotional intelligence. Nevertheless, the relationship between emotional bonds and life satisfaction may differ based on life stages. Research by Vandeleur and his colleagues (2009) has shown that emotional well-being is different by social

situations for adolescents and parents. With a sample of 95 adolescent-parent pairs, they found that parents tended to perceive higher well-being when with friends or colleagues than being alone, whereas adolescents reported lower well-being with peers or siblings compared to staying alone.

Though the literature has provided evidence suggesting a positive relationship between emotional bonds and life satisfaction, their discussions were based on either theories or a limited number of observations. Furthermore, few studies have directly brought age into the conversation regarding the relationship between emotional bonds and life satisfaction. In this paper, we will fill in the gap by conducting an empirical analysis with a national-wide dataset to explore the relationship and expand on previous results by giving a systematic estimation of the interaction effect between the emotional bond and age on life satisfaction.

In our study, we use the data from the Canadian Community Health Survey to estimate linear regression models using the emotional bond and age as explanatory variables and life satisfaction as the outcome variable. In our main model, we incorporate an age quadratic term, based on which we later add interaction terms between emotional bond and age. Running additional specifications to take control on sex or living arrangement would help address identification concerns - no other variables are correlated with the emotional bond.

Our result shows that the estimated effect of developing emotional bonds on life satisfaction is significant and positive. More perception of emotional bonding leads to higher life satisfaction in general. We also identify a U-shaped effect of age on life satisfaction. Furthermore, different degrees of emotional bonding may lead to distinct age effects on life satisfaction. In the second half of the study, we re-evaluate the model by using robust standard errors to eliminate the potential issue of heteroskedasticity. The result agrees with our main finding. Finally, we perform a robustness check to verify previous results in different age groups and complement our understanding of the main factors of life satisfaction by age.

I. Data

In this study, we use the cross-sectional dataset, Canadian Community Health Survey - Annual Component 2017-2018 (CCHS) (Statistics Canada, 2020). At the federal, provincial, and territory levels, CCHS gives representative estimates of the population's health status and healthcare requirements. The dataset contains information on various health topics, such as mental health, diseases, and social conditions, providing relevant variables to our research. To address the relationship between emotional bond and life satisfaction by age, we adopt the variables “satisfaction with life in general (GEN_010)” (life satisfaction), “relationship-strong emotional bond with at least one person (SPS_040)” (emotional bond), and “age (DHHGAGE).” We also set demographic variables (such as “sex (DHH_SEX)” and “family arrangement (DHH_DGLVG)”) as controls.

According to data features and documentation, the “life satisfaction” variable measures an individual’s level of satisfaction with their life overall, ranging from 0 (very dissatisfied) to 10 (very satisfied). “Emotional bond” measures the degree of agreement to the statement “I have a strong emotional bond with at least one person,” with response options including strongly agree, agree, disagree, and strongly disagree. The “age” variable consists of a series of age intervals from “Age between 12 and 14” to “Age 80 and older.”

To accommodate the usage in our study, we perform transformations on selected variables. The age group is converted into a quantitative variable by taking the midpoint of each interval (without an upper bound, the lower bound “80” of the last category “age 80 or older” is adopted). The new continuous variable in the model enables an incremental interpretation of the age effect. The emotional bond and sex variables are transformed from qualitative variables into dummies. For family arrangement in control, since the individual’s identity of parents or children is not the primary interest and may disturb our investigation with the age effect, we

redefine a categorical variable “Living Arrangement” to capture only the living condition¹.

Table 1 presents the summary statistics of the data. It shows that the age variable spans from 13 to 80 with a mean of 48.7 and a standard deviation of 19.6, indicating an approximately even distribution of data in terms of age, allowing for analysis of the age effect over the entire age range.

TABLE 1—SUMMARY STATISTICS

	Mean	Std. Dev.	Max	Min
Age	48.694	19.586	80	13
Life Satisfaction	8.018	1.687	10	0
Female	0.539	0.499	1	0
Agreement to Emotional Bond				
Strongly Agree	0.586	0.493	1	0
Agree	0.379	0.485	1	0
Disagree	0.030	0.171	1	0
Strongly Disagree	0.004	0.065	1	0
Living Arrangement				
Living Alone	0.395	0.489	1	0
Living with Others	0.056	0.230	1	0
Living with Family	0.488	0.500	1	0
Other	0.061	0.239	1	0

II. Empirical Strategy and Results

We now test to what extent emotional bonding with others is a promoter for satisfaction with life. As mentioned, we are also interested in how aging plays a role in well-being.

To perform the statistical analysis, we estimate a linear regression model and use OLS estimators in this paper:

$$(1) \quad Y_i = \beta_0 + \sum_{b=1}^3 \beta_{1,b} E_i^b + \beta_2 A_i + \beta_3 A_i^2 + \epsilon_i$$

Let i index the observation. Y_i is the satisfaction with life in general. E_i is the degree of agreement for a strong emotional bond with at least one person. In the

¹ See Appendix A for details of this transformation.

summation function $\sum_{b=1}^3 \beta_{1,b} E^b_i$, E^b_i is an indicator variable equal to one if E_i falls in the given level b (e.g., “agree”). Given previous psychology investigation, we expect that higher degrees of agreement with the statement “I feel a strong emotional bond with at least one other person” renders higher scores in life satisfaction. In other words, the associated coefficients β s will be more negative with higher disagreement. A_i is the age. Since Ree and Alessie (2011) suggested that life satisfaction is U-shaped with age, we include a quadratic term of age in the equation. The coefficients β_2 and β_3 capture the varying marginal effect of age on life satisfaction. ϵ_i denotes the error term. Column 1 in Table 2 contains results from estimating the model equation (1).

To test whether age acts as a moderating variable that alters the association between the emotional connection and life contentment, as suggested by Vandeleur and his colleagues (2009), we include an interaction term into the equation:

$$(2) \quad Y_i = \beta_0 + \sum_{b=1}^3 \beta_{1,b} E^b_i + \beta_2 A_i + \beta_3 A_i^2 + \sum_{b=1}^3 \sigma_b (E^b_i \times A_i) + \epsilon_i$$

$E^b_i \times A_i$ is the interaction between the emotional bond of a given category b and age. The estimates of parameters are summarized in column 2 in Table 2.

These two models would give a relatively comprehensive understanding of the effects of two explanatory variables on the outcome. However, since humans are complex in nature, our result may be intimidated if other concepts co-vary with emotional bonds and exert an age-varying effect on life satisfaction. For example, sex is intercorrelated with social identity formation (Cerezo et al., 2019), which may in turn affect how individuals develop emotional bonds with people in society at different ages. Living arrangements may determine the affordability of reaching out and forming intimate relationships with others in a private setting. As shown by research, these two factors may have effects on life satisfaction (Nordenmark, 2017). To address the concern of identification, we include sex and living arrangements separately in our model as controls. Columns 3 and 4 summarize the

estimated results. If the parameters of our main interest have little variation compared to when controls are excluded, our main testing result is consolidated.

TABLE 2—THE EFFECT OF EMOTIONAL BOND OF LIFE SATISFACTION BY AGE

	Dependent variable:						
	Satisfaction with Life in General						
	(1)	(2)	(3)	(4)	Young	Middle	Old
Emotional Bond-Agree	-0.629*** (0.019)	-0.469*** (0.051)	-0.630*** (0.019)	-0.602*** (0.023)	-0.475*** (0.042)	-0.682*** (0.023)	-0.561*** (0.049)
Emotional Bond-Disagree	-1.697*** (0.053)	-1.299*** (0.151)	-1.699*** (0.053)	-1.549*** (0.057)	-1.071*** (0.121)	-1.854*** (0.065)	-1.549*** (0.126)
Emotional Bond-Strongly Disagree	-2.704*** (0.138)	-2.692*** (0.420)	-2.706*** (0.138)	-2.434*** (0.146)	-1.099*** (0.366)	-3.123*** (0.161)	-1.707*** (0.373)
Age	-0.054*** (0.002)	-0.053*** (0.002)	-0.054*** (0.002)	-0.061*** (0.003)	-0.374*** (0.078)	-0.057*** (0.007)	0.676 (0.546)
Age ²	0.001*** (0.00002)	0.001*** (0.00003)	0.001*** (0.00002)	0.001*** (0.00003)	0.007*** (0.002)	0.001*** (0.0001)	-0.005 (0.004)
Emotional Bond-Agree × Age		-0.003*** (0.001)					
Emotional Bond-Disagree × Age		-0.008*** (0.003)					
Emotional Bond-Strongly Disagree × Age		-0.0004 (0.008)					
Female			Yes	Yes			
Living Arrangement							
Constant	9.459*** (0.052)	8.418*** (0.031)	8.461*** (0.026)	8.367*** (0.052)	12.735*** (0.668)	9.520*** (0.161)	-16.821 (20.664)
Observations	32,724	32,724	32,724	23,268	4,486	22,623	5,615
R ²	0.076	0.077	0.076	0.105	0.117	0.078	0.044

Note: The dependent variable in all columns is satisfaction with life in general scoring from 1 to 10. The regressors of interest are different levels of agreement to the statement “having emotional bond with at least one person”, age, squared age, and interaction terms that include the two concepts. The first 4 columns report results from the main analysis. The last 3 columns present results from the robustness check. “Young” corresponds to the group younger than 27. “Middle” is the sample of middle age between 27 to 70. “Old” is the estimated result based on the group of older people.

*p<0.1; **p<0.05; ***p<0.01

Discussion

Columns 1 to 4 in Table 2 summarized the main results of our analysis. From the first three rows, the estimated effects of different levels of emotional bonding on satisfaction with life are large in absolute terms and statistically significant. Point estimates in column 1 imply that moving from the base group that “strongly agree” with the emotional bonding statement to “agree” leads to -0.629 scores less in life satisfaction. The decreasing effect almost triples while moving to “disagree”

(-1.697) and strengthens by five times to “strongly disagree” (-2.704). In summary, the more intense the level of disagreement, the lower satisfaction with life, which is consistent with our hypothesis. Similar estimated effects are obtained with different assumptions about the functional form of the specification, boosting the robustness of our result.

The point estimates of age coefficients in column 1 are statistically significant with a 0.01 significance level. The marginal effect of age on life satisfaction is $(-0.054 + 0.002 \times \text{Age})$. In other words, life satisfaction slowly decays from birth until the age of 27 and grows afterwards, which echoes the proposal of U-shaped life satisfaction with age found in the literature (Ree and Alessie, 2011). However, the twisting point of 27 is earlier than previously suggested (the U shape was found between the age 30 to 70 in Ree and Alessie’s research). This leads us to later conduct a robustness test by separating the age groups to investigate any potential differences in the effect of age and emotional bond on life satisfaction.

Lastly, results from column 2 in Table 2 imply that the observed interaction effects between the emotional bond and age are negative and small in absolute value with statistical significance for the “Agree \times Age” and “Disagree \times Age” groups. The coefficient for the “Strongly Disagree \times Age” level has no statistical significance. Point estimates suggest that if an average individual “agrees” with the emotional bond statement, then their life satisfaction will decrease by an additional -0.003 per year of age increase. The decreasing magnitude with age enlarges to -0.008 for the “disagree” group. The comparison of the interaction effect suggests that if one perceives less emotional connection with others, satisfaction with life reduces faster with age, but the buffering effect may diminish if an extremely low perception of emotional bonding overwhelms the aging effect. This complements our understanding of how the emotional bond and age interact in the effect on life satisfaction.

III. Specification Check

In this section, we use the White's test to evaluate heteroskedasticity. Heteroskedasticity appears when there is a certain correlation between the variance of the residual term and the explanatory variables in the model. An important consequence of heteroscedasticity is that although the OLS estimator remains unbiased and consistent, it loses the property of efficiency (i.e., a small variance of the coefficient estimator), rendering more uncertainty in the inferential result. A well-founded test to identify heteroskedasticity is the White's test. Applying it, we pass the fitted value of life satisfaction (\hat{Y}) and regression residuals ($\hat{\epsilon}_i$) from model equation (1) to the test equation:

$$(3) \quad \hat{\epsilon}_i^2 = \alpha_0 + \alpha_1 \hat{Y} + \alpha_2 \widehat{Y^2} + e_i$$

If the homoscedasticity assumption holds, there should be no correlation between residuals and the fitted value; in other words, we would observe insignificance against the hypothesis $\alpha_1 = \alpha_2 = 0$. Otherwise, further adjustment is required to address heteroscedasticity. See Appendix Table B.1 for the result of the White test.

Unfortunately, our model may suffer from a heteroskedasticity issue. The F-test which evaluates the joint hypotheses for zero coefficients in value is significant and provides evidence against the homoscedasticity assumption. This leads us to re-evaluate the coefficient estimators by adopting robust standard errors (the “sandwich” estimators) suggested by White². However, the result shows that the point coefficient estimates are the same as our regression model (1) except for slightly larger standard errors. Since the differences are inconsequential, we will proceed with interpretations in the original main analysis.

² Appendix Table B.2 contains the regression result with robust standard errors.

IV. Robustness Check

From our primary discussion, age may have a U-shaped effect on life satisfaction, reaching the trough at the age of 27. This leads us to question whether a different pattern of life satisfaction may be formed across the age threshold. A positive reflection would be different degrees of effects of emotional bonds on life satisfaction by age groups. In this section, we divide the dataset by the age of 27 and conduct a similar regression analysis based on our main model (1). We also separate out a sample of individuals older than 70, since the previous study suggested an additional dip in life satisfaction at old age (de Ree & Alessie, 2011). The last three columns in Table 2 report the result of the robustness check.

After coercing the squared age term into the regression equation across age groups, the twisting point of the age effect around 27 is consistent with our previous finding. From rows 4 and 5, the marginal age effect on life satisfaction for the youngest group is $(-0.374 + 0.014 \times \text{Age})$ and for the middle age group is $(-0.057 + 0.002 \times \text{Age})$. The first statistic implies that life satisfaction decreases with age until 26.7 which is almost consistent with the second that life satisfaction improves with age after 28.5. However, the age effect is not statistically significant for the old group. This result is concordant with our main analysis.

Though the overall trend holds, the effect of age on life satisfaction is different for age groups in magnitudes. For example, estimates from the young group suggest that an individual aged 25 is likely to value life satisfaction almost 1 point (-0.94) less than an adolescent aged 15 on a 0-10 scale. In contrast, an average person aged 45 will score themselves in life satisfaction only 0.23 higher than one aged 35 from the middle group column. The comparison shows that more variation in life satisfaction depends on the age for the younger group than for the middle age group.

The effects of emotional bonds on life satisfaction appear to be significant across all age groups. Furthermore, the emotional connection seems to matter more for the middle age group. Estimates from the first three rows imply that a higher degree of

disagreement with the emotional bonding statement will result in a greater negative increase in the evaluation of life satisfaction in group two than in the other two. The most prominent difference happens as a person moves from “agree” to “strongly disagree.” The negative effect surges almost five-fold (from -0.682 to -3.123) for middle age compared to the other two cohorts who tend to perceive 2.3 times and 3 times less contentment with life. This result suggests that emotional bonding may be a more essential component that contributes to life satisfaction for the middle age than the younger and older cohorts.

In this section, we show that age and emotional bonding have distinct weights to life satisfaction across age groups. Age triggers a decrease in life satisfaction for adolescents and young people who are just starting adulthood. This may be comprehensible since people have drastic physical and psychological development at an early age with inflated responsibility and pressure. In comparison, age matters less but emotional bonding contributes more to life satisfaction for the middle age group. As the career and private living components tend to stabilize with age, emotional relations may provide greater internal satisfaction needs. For old people, there is only very weak evidence in favour of the age effect. Emotional bond also plays a less important role in life satisfaction compared to younger cohorts. The smallest explanatory power indicator R^2 (0.044 compared to 0.117 and 0.078 in columns 1 and 2) echoes with the discussion, leading future research to investigate other contributing factors to life satisfaction for old people.

V. Conclusion

This paper has used the CCHS national survey data to estimate the correlation effect of emotional bond on life satisfaction in the entire age range from 12 to 80 and older. Emotional bonds have a large and positive effect on the subjective evaluation of life, conditioning on a U-shape effect of age on life satisfaction

twisting in the late 20s. Expanding on previous literature, we found that a higher level of emotional bonding may decelerate the negative aging effect on life satisfaction. Acknowledging a potential heteroskedasticity issue, our result remains robust and significant after adjusting the standard error. The last section of robustness analysis enriches our understanding of how emotional bonds and age may contribute differently to life satisfaction for age groups. Specifically, age is a prominent factor that may reduce life satisfaction for people under their 30s. In comparison, people in their middle adulthood rely more on emotional bonding to evaluate their satisfaction with life. Emotional bonding also contributes to life evaluation for the old, but further investigation on effects of other correlated factors is encouraged for larger significance and magnitudes.

The finding of this paper tends to give scientific support for developing emotional connections with family members, friends, or partners to boost the subjective perception of life quality for all ages. Further, gaining insight into this relationship would be a preliminary direction for future research in the same field.

REFERENCES

- Andrews F. M., McKennell A. C. (1980). Measures of self-reported well-being: There affective, cognitive and other components. *Social Indicators Research*, 8,127-155.
- Cerezo, A., Cummings, M., Holmes, M., & Williams, C. (2019). Identity as resistance: Identity formation at the intersection of race, gender identity, and sexual orientation. *Psychology of Women Quarterly*, 44(1), 67–83.
<https://doi.org/10.1177/0361684319875977>
- Nanu, D. E. (2015). The Attachment Relationship with Emotional Intelligence and Well-Being. *Journal of Experiential Psychotherapy*, 18(2), 70.
- Gilman, R., & Huebner, S. (2003). A review of life satisfaction research with children and adolescents. *School Psychology Quarterly*, 18(2), 192–205.
<https://doi.org/10.1521/scpq.18.2.192.21858>

- Greenman, P. S., & Johnson, S. M. (2022). Emotionally focused therapy: Attachment, connection, and health. *Current Opinion in Psychology*, 43, 146–150. <https://doi.org/10.1016/j.copsyc.2021.06.015>
- Karreman A. & Vingerhoets Ad J.J.M. (2012). Attachment and well-being: The mediating role of emotion regulation and resilience. *Personality and Individual Differences*, 53(7), 821-826. <https://doi.org/10.1016/j.paid.2012.06.014>
- Lim, AN. & Park, YS. (2017). A Study on the Factors Affecting Life Satisfaction: Focused on Social Support. *The Journal of the Korea Contents Association*, 17(3), 675-682. <https://doi.org/10.5392/JKCA.2017.17.03.675>
- Nordenmark, M. (2017). The importance of job and family satisfaction for happiness among women and men in different gender regimes. *Societies*, 8(1), 1. <https://doi.org/10.3390/soc8010001>
- Palmore, E., & Luikart, C. (1972). Health and Social Factors Related to Life Satisfaction. *Journal of Health and Social Behavior*, 13(1), 68–80. <https://doi.org/10.2307/2136974>
- de Ree, J., & Alessie, R. (2011). Life satisfaction and age: Dealing with underidentification in age-period-cohort models. *Social Science & Medicine*, 73(1), 177–182. <https://doi.org/10.1016/j.socscimed.2011.04.008>
- Statistics Canada. (2020). Canadian Community Health Survey - Annual Component 2017-2018: Public Use Microdata File (PUMF) - 24 Month.
- Umberson, D., & Montez, J. K. (2010). Social relationships and health: a flashpoint for health policy. *Journal of health and social behavior*, 51 Suppl (Suppl), S54–S66. <https://doi.org/10.1177/0022146510383501>
- Vandeleur, C. L., Jeanpretre, N., Perrez, M., & Schoebi, D. (2009). Cohesion, satisfaction with family bonds, and emotional well-being in families with adolescents. *Journal of Marriage and Family*, 71(5), 1205–1219. <https://doi.org/10.1111/j.1741-3737.2009.00664.x>

Attribution Page

Group Members: Patty Li, Cici Liu (coordinator)

Introduction by Patty Li, check by Cici Liu

Data Description by Patty Li, check by Cici Liu

- i. Summary statistics by Cici Liu

Model by Cici Liu

- i. Table of Results by Cici Liu

Discussion by Cici Liu

Specification Check by Patty Li, check by Cici Liu

Robustness by Cici Liu

Conclusion by Cici Liu

References by Patty Li and Cici Liu

Main Coding by Cici Liu, Specification Check by Patty Li

Appendix A

For family arrangement, we redefine a categorical variable “living status” to capture the living condition. This variable is used as a control in specification 4 of our main analysis. The original variable distinguishes the individual’s identity of “parents” or “children,” which is not of our interest to and may disturb the analysis of the age effect on life satisfaction. For the new variable, we keep the second category as living with others and rename the first category “unattached individual living alone” as “alone.” The last four categories – “individual living with spouse/partner” “parent living with spouse/partner and child(ren)” “single parent living with children” and “child living with a single parent with or without siblings” – are categorized as “living with family.”

Appendix B.1

TABLE B.1—THE WHITE TEST RESULT

	Dependent variable:

	Estimated Residual Square ($\hat{\epsilon}_i^2$)
\hat{Y}	-5.046*** (1.112)
\hat{Y}^2	0.240*** (0.072)
Constant	27.638*** (4.293)
Observations	32,724
F Statistic (df=2; 32721)	203.763***
Note:	* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

TABLE B.2—THE REGRESSION RESULT WITH ROBUST STANDARD ERRORS

	Dependent variable:	

	Satisfaction with Life in General	
	default	robust
	(1)	(2)
Emotional Bond-Agree	-0.629*** (0.019)	-0.629*** (0.019)
Emotional Bond-Disagree	-1.697*** (0.053)	-1.697*** (0.053)
Emotional Bond-Strongly Disagree	-2.704*** (0.138)	-2.704*** (0.220)
Age	-0.054*** (0.002)	-0.054*** (0.002)
Age ²	0.001*** (0.00002)	0.001*** (0.00002)
Constant	9.459*** (0.052)	9.459*** (0.047)
Observations	32,724	32,724
R ²	0.076	0.076
Adjusted R ²	0.076	0.076
Residual Std. Error (df=32718)	1.621	1.621
F Statistic (df=5; 32718)	540.188***	540.188***
Note:	* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$	