Financial Literacy Types and Financial Behaviors Among Adolescents: Role of Financial Education

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The mismatch between financial objective and subjective knowledge that occurs in youth and adolescents has been understudied in the literature. Based on objective and subjective financial literacy scores, this study categorizes financial literacy into four types: financial literacy overconfidence, underconfidence, competence, and naïvete in a sample of adolescents. Data were collected from 330 students aged around 15 years old in six middle schools in Hong Kong. The results indicate that adolescents who are overconfident about their financial literacy are more likely to engage in risky financial behavior and report higher levels of financial autonomy. A randomized experimental trial was conducted to assess whether financial education could change the mismatch between financial objective and subjective knowledge. The results show a significant increase in underconfidence after the financial education intervention, but no significant change in the other three categories. The findings highlight the same type of financial literacy overconfidence in both adolescents and adults and has implications for financial counselors and educators who would improve the financial engagement of adolescents.

Keywords: adolescents, financial behavior, financial education, financial literacy, overconfidence

Both objective and subjective financial knowledge can predict healthy financial behaviors (Allgood & Walstad, 2016; Andreou & Philip, 2018; Henager & Cude, 2016; Herawati et al., 2018; Kim & Yuh, 2018; Tang & Baker, 2016; Yao & Meng, 2018; Zhu & Chou, 2018b). Due to surprisingly mixed findings, the joint role of objective and subjective financial knowledge in shaping financial habits has become a focus of attention in recent studies. Four combinations of objective and subjective financial knowledge are recognized, and on this basis, individuals can be categorized as overconfident, underconfident, competitive, or naïve regarding financial literacy (Porto & Xiao, 2016; Xia et al., 2014).

Overconfidence in financial literacy indicates an evaluation of personal subjective financial knowledge as being higher than average, while actual objective financial knowledge is lower than the average; financial literacy underconfidence is defined as the opposite. Those whose objective and subjective financial knowledge are both above average are identified as having financial literacy competence; while those for whom both evaluation outcomes are lower than average are considered to be naïve regarding financial literacy (Porto & Xiao, 2016; Xia et al., 2014).

The 2012 National Financial Capability Study performed by the Financial Industry Regulatory Authority (FINRA) revealed that, among U.S. respondents, the percentages of financial literacy overconfidence, underconfidence, competence, and naïvete were 11.6%, 33.8%, 28.1%, and 26.5%, respectively (Porto & Xiao, 2016). Based on a nationwide online household consumption and finance survey in China, Xia et al. (2014), reported that 23.9% and 19% of respondents were financial literacy overconfident and underconfident, respectively. Using the data from a representative sample of Dutch families that included 1,276 households, Kramer (2014) reported that the percentage of households categorized as financial literacy overconfident or underconfident were both 29.5%.

Previous research has shown greater interest in assessing the effect of financial literacy overconfidence on subsequent financial behaviors rather than on the outcomes of the other three combinations. When individuals express

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overconfidence about having their financial issues under control, they are likely to continue their current behavior without further analysis of technical details and potential challenges; these individuals believe that their financial behaviors will necessarily lead to positive outcomes (Bandura, 2018). Therefore, people with financial literacy overconfidence are less likely to engage in protective financial behaviors and are more likely to engage in extravagant financial activities.

This study investigates the prevalence of financial literacy overconfidence, underconfidence, competence, and naïvete in a sample of Hong Kong adolescents, while also assessing the impact of this factor on the risky or healthy financial behaviors of the adolescents and on their financial autonomy. The findings of this study will extend the analysis of the mismatch between financial knowledge and confidence from adults to adolescents, as well as contributing to the understanding of the links between the mismatch and saving, spending, and borrowing behaviors, which are understudied in the literature.

If an association between financial literacy overconfidence and financial behavior should be detected, a key question will be whether this mismatch can be reshaped through school financial education programs as secondary school is a natural setting in which to deliver a financial education course. Amagir et al. (2018) reviewed 36 high-quality studies that evaluated the effectiveness of financial education programs conducted with children and youth between 2004 and 2015. They noticed that of 24 programs reviewed, only one reported on in a study by Lührmann et al. (2015) evaluated the effects of financial education on both objective and subjective financial knowledge. However, this team did not assess how the school's financial education could affect and transform the mismatch identified. To address this gap, the current study has designed a randomized trial to evaluate how a financial education program can influence the mismatch between financial knowledge and confidence.

Literature Review and Hypotheses

Financial Literacy Overconfidence and Subsequent Financial Behaviors

Findings from previous studies indicate financial literacy overconfident individuals tend to rely on their own information to make financial decisions rather than seek advice from financial counselors (Gentile et al., 2016; Kramer, 2014), have a less diversified investment portfolio (Mouna & Jarboui, 2015), engage in costly financial practices such as pay-day loans and tax advances (Tokar Asaad, 2015), trade too frequently in the financial markets (Barber & Odean, 2001; Van Rooij et al., 2011), and become the victims of financial fraud (Anderson et al., 2015). An experiment performed among undergraduate students in a private university in upstate New York revealed that financial literacy overconfident students tended to misunderstand the risks associated with unenforceable financial contracts that could lead to suboptimal investment outcomes (McCannon et al., 2016).

However, the impact of financial literacy overconfidence is not necessarily negative in directing financial behaviors. Porto and Xiao (2016) found that although overconfident U.S. consumers were less likely to seek professional financial advice in saving, investments, or mortgages, they were more likely to seek advice for debt counseling and tax planning. Importantly, Xia et al. (2014) found financial literacy overconfident Chinese consumers were more likely to participate in the stock market, while underconfident ones were less likely to join it.

Most previous studies assessing the effect of financial literacy overconfidence on subsequent financial behaviors have been concerned with investment; three other basic personal financial behaviors (saving, spending, and borrowing) have received little attention. We also noticed that the data in almost all the previous studies were collected among adults, while the prevalence of the mismatch between financial knowledge and confidence in adolescents, and its impact on their financial habits, have received little attention. Considering that saving, spending, and borrowing, rather than investment, make up almost the whole financial world of adolescents, investigating the effect of the mismatch between financial knowledge and confidence in adolescents can, simultaneously, address both these theoretical limitations.

Previously, financial practitioners and educators showed little interest in studying the financial behaviors of adolescents as the financial well-being associated with investment decisions made by adults was much more important than that of the saving, spending, and borrowing decisions made by adolescents. However, the dominance of mobile digital service usage in modern society has reshaped

the financial participation of youth and adolescents in the economic milieu. The current generation of youth and adolescents control more financial resources and have more opportunities to complete a range of transactions online than any previous generation. The negative impact of unhealthy and risky financial behaviors on the financial well-being of adolescents has the potential to affect their quality of life. Most importantly, mobile digital services and the increased monetary resources of adolescents may converge to increase the prevalence of financial literacy overconfidence, driving a need to study the impact of financial literacy overconfidence on the financial behaviors of adolescents.

Adolescent Financial Behavior

The impact of the financial behaviors of youth and adolescents on the economic world can no longer be overlooked. A report by FONA International shows that teens in the United States have sizable amounts of money to manage, and that their spending reached 91.1 billion U.S. dollars (USD) in 2014 (FONA, 2014). A survey conducted among 1,002 U.S. adults found that two-thirds of U.S. parents provide regular allowances with an average amount of 30 USD each week (American Institute of CPAs, 2019). A study by The Center for Generational Kinetics showed that 77% of U.S. youth aged 14–21 earn money through freelance work or a part-time job (The Center for Generational Kinetics, 2017). The income generated from their employment and family allowances, combined, cover the spending of U.S. adolescents. In comparison, a representative survey with 1,072 adolescents indicates that 89% of Hong Kong adolescents receive a regular allowance from their family and their income is mainly from this allowance; only 8% indicated that they generate income from part-time jobs. Family members provide a more generous allowance than their Western counterparts (e.g., the United States): 43% of them received 501 Hong Kong dollars (HKD) to 2,500 HKD (the equivalent of 61 USD to 250 USD) each week from family members (Kara, 2010).

Technology is considered to be a driver of consumption, influencing consumers through information, motivation, and convenience (Pires et al., 2006). The current generation of youth more readily assimilate online retailing technologies than their counterparts from previous generations. As they communicate with their families concerning the technical details of modern retailing, young people have great influence in making consumption decisions, sometimes even influencing the family's decisions (Bruhn et al., 2013). With the emergence and prevalence of social media, the consumption decisions of youth are also partially influenced by the platforms and the leaders in their networks (Bergström & Jervelycke Belfrage, 2018; Cao & Liu, 2017). Youth and adolescents may establish their identities in their social media networks by increasing their fashion- and trend-driven consumption (Baker & Robards, 2016; Giroux & Pollock, 2018). In addition to increased consumption in the real world, social networking facilitates the establishment of a virtual social world in which the consumption of virtual items such as subscription and upgrade fees, together with electronic devices, has become prevalent among youth and adolescents (Kim et al., 2012; Mäntymäki & Riemer, 2014). The FONA report found that U.S. youth (8–24 years) collectively spent around 211 billion USD annually (FONA, 2014) of which around 15 billion USD were spent on virtual goods (SuperData Research, 2012).

Emergence of Financial Literacy Overconfidence in Adolescents

Mobile banking now includes mobile wallets that support payments, transfers, and loans, and this has gained wide popularity and acceptance among youth (Bhardwaj & Aggarwal, 2016; Wijland et al., 2016). Current trends indicate that worldwide, youth dominate mobile wallet usage. A survey by Statista (2015) found the number of youth using mobile banking to pay for retail goods and services was five times that of middle-aged and older adults, and that the amount of virtual currency kept in their mobile wallets was three times greater. In the United States, the proportion of youth aged 18–29 using digital wallets reached 30%, exceeding the usage of all other age groups (Statista, 2017). In comparison, the rate of mobile wallet use in Hong Kong youth aged below 30 was much higher, reaching 65.2% (Hong Kong Institute of Asia-Pacific Studies, 2018). In a report analyzing 2017 mobile payment usage in Mainland China, cash accounted for less than 20% of spending among 51% of Chinese youth (Tencent, 2017).

Experience accumulated from mobile banking may equip youth with confidence in the use of financial technology and render them more familiar with basic financial terms and concepts. However, knowledge accumulated in this way is no substitute for systematic financial learning. The latest review by Garg and Singh (2018) demonstrates

that the objective financial knowledge of youth in most parts of the world is low. The illusion of having high levels of financial knowledge when using financial technology for managing money combined with a low level of objective financial knowledge may cause overconfidence in youth regarding their own financial literacy. This mismatch between confidence and knowledge is also likely to be related to family economic status. In the United Kingdom, the amount of pocket money given to children aged 11–18 varies widely across different economic levels (Statista, 2016). Adolescents with low financial resources have less opportunity to accumulate confidence via financial transactions. Although they may have undertaken systematic financial education, in such cases, underconfidence regarding financial literacy is still likely.

Hypotheses

Considering that a large proportion of previous studies that addressed financial literacy overconfidence concluded that it is a negative psychological position, we hypothesize that financial literacy overconfidence will be negatively associated with healthy financial behavior but positively associated with risky financial behavior (Hypothesis 1).

Financial autonomy refers to confident and self-directed saving, consumption, and money management behaviors. These tend to be positive, and are closely related to a sense of participation (Jariwala & Dziegielewski, 2017). Considering previous findings concerning a positive association between financial literacy overconfidence and financial participation (Xia et al., 2014), we hypothesize that financial literacy overconfidence is able to promote financial autonomy in adolescents (Hypothesis 2).

Considering that the results of Lührmann et al. (2015) show that the financial education program improved subjective financial knowledge more than objective financial knowledge, we hypothesize that school financial education cannot change financial literacy overconfidence, but that it can reduce underconfidence and promote financial literacy competence (Hypothesis 3).

Method

Procedure

To ensure that the sample represented a wide range of adolescent students in Hong Kong, six middle schools with different academic rankings and reputations were targeted tive relationships with these schools in terms of teaching and learning and project development, and the principals all supported both our data collection and the financial intervention. We successfully invited a total of 330 students aged around 15 years from these six schools to participate. We obtained formal approval from them and from their parents before commencing their part of the project.

All 330 students were involved in the data collection at baseline, and this sample was used to test the first and second hypotheses. This sample was labeled Sample A. At the next stage, we randomly selected two schools (ranked 2A and 2B) for the control group; the other four were assigned to the experimental group and became the recipients of the financial education intervention. This design ensured no spillover effect between classes involving different groups in the same school.

Students in the experimental groups received our specially designed financial education course that integrates the U.S. Financial Fitness For Life (FFFL) module and the Hong Kong-localized Chin Family textbook, which was designed and published by The Investor and Financial Education Council. The course took a total of 15 hours, distributed across 10 weeks, from May 2017 to July 2017. During this period, students learned money basics, money management, which included saving, spending, borrowing, and investment, and basic knowledge of financial planning. The course involved lectures, simulation games, case discussions, and videos. The course was delivered face-to-face by part-time research assistants who were third-year students of a bachelor's program in financial and business education. All were well-trained and closely supervised by the research team.

All 330 students were invited to be involved in the second wave of data collection 5 months after the intervention. However, one school in the control group (ranked as 2A) elected to withdraw from the study and did not join the second wave of data collection. Therefore, the sample that was used to test the third hypothesis contained five schools. One was in the control group (ranked 2B) and four were in the experimental group. This sample contained 270 students. After excluding dropouts and outliers, the sample used to test the third hypothesis included 247 students. This sample was labeled sample B.

TABLE 1. Descriptive Statistics of Variables for the Experimental and Control Groups (N = 220)

	Control Group (n = 57)	Experimental Group (n = 163)	t test / Chi-Square Test
	Mean (Standard deviation) or Percentage		Degree of freedom, t or Chi-square value
Age	14.47 (0.68)	14.20 (0.66)	t (88) = 2.72**
Male	50.9%	64.4%	$\chi^2(1) = 3.25$
Parents living together	80.7%	86.7%	$\chi^2(1) = 1.19$
Poverty	10.7%	11.9%	$\chi^2(1) = 0.06$
Parental highest education	4.26 (1.39)	4.27 (1.31)	t (204) = −0.02
No education	0.0%	0.7%	
Elementary school	3.8%	1.3%	
Middle school	20.8%	22.9%	
High school	52.8%	50.3%	
Diploma	7.5%	9.2%	
Associate degree	1.9%	3.3%	
Bachelor's degree	9.4%	11.1%	
Postgraduate degree	3.8%	1.3%	
Father: works full-time	95.7%	88.5%	$\chi^2(1) = 2.02$
Mother: works full-time	61.1%	55.7%	$\chi^2(1) = 0.47$
Financial literacy overconfidence	42.1%	33.1%	$\chi^2(1) = 1.49$
Financial literacy underconfidence	5.3%	12.9%	$\chi^2(1) = 2.52$
Financial literacy competence	36.8%	34.4%	$\chi^2(1) = 0.12$
Financial literacy naivete	15.8%	19.6%	$\chi^2(1) = 0.41$

** $p < .01$.

In both waves of data collection, students were invited to complete a self-administered questionnaire. To ensure data quality, we appointed a well-trained research assistant to supervise the assessments and to respond to any inquiries from the students.

Sample

In the sample A, 48 students failed to report their subjective financial knowledge, which was a key variable in determining the mismatch between financial knowledge and confidence. Excluding these cases, the final sample A contained 282 respondents. The mean age of the respondents was 14.26 (SD = .61) years. Females made up 57.4%. The majority of the adolescents came from families where the father and mother lived together. Only 12.3% of the adolescents' families were categorized as poor, based on whether or not they were recipients of Comprehensive Social Security Assistance (CSSA). CSSA is a means-tested, social security net in Hong Kong that offers a basic living allowance to the most economically disadvantaged residents. Over half the parents had completed a high school education (n = 133, 50.8%), followed by about a fifth who had completed middle school (n = 64, 24.4%). The highest educational achievement of around a tenth was a bachelor's degree (n = 24, 9.2%). The proportion of fathers with full-time jobs was 89.8%; for mothers, this was 53.7%.

A total of 27 students did not report their subjective financial knowledge either in the pretest or in the posttest. After excluding these cases, the final sample B contained 220 participants. The demographic attributes of the experimental and control groups are reported in Table 1. The attribution analysis results in Table 1 show that the group assignment was more or less successful, although it must be noted that the mean age of participants in the experimental group was significantly lower than that of those in the control group.

Measurements

Mismatch Between Knowledge and Confidence. Objective financial knowledge was assessed by the FFFL test, a standardized test designed by the U.S. National Council on Economic Education (NCEE) and considered appropriate for high school students. Previous studies have validated this measure for assessing basic financial understanding in high school students (Cameron et al., 2013; Harter & Harter, 2009; Walstad & Rebeck, 2016). The FFFL comprises 50 multiple choice questions evenly distributed across five themes: economic thinking, earning income, saving, spending and using credit, and money management. The original U.S. version of the test was translated into Chinese and then checked by back-translation by our research team in Hong Kong to establish the validity of the Chinese adaptation (Zhu & Chou, 2018a). The internal consistency of scores for the first and second waves were 0.67 and 0.75, respectively. Scores for objective financial knowledge were calculated by adding the scores for the respective items. For subjective financial knowledge, participants were asked to indicate a value ranging from 1 (very low) to 7 (very high).

We followed the empirical definition provided by Porto and Xiao (2016) to define financial knowledge types. We first calculated the average scores of both subjective and objective financial knowledge. Those achieving scores above the mean in both were defined as "competent." Conversely, those with scores below both the means were labeled as "naive." Participants who reported higher than average subjective financial knowledge combined with lower than average objective financial knowledge were termed "overconfident," while those showing the reverse were termed "underconfident."

Risky Financial Behavior. There are few well-grounded scales for measuring risky financial behavior in adolescents. In this study, we utilized two items to measure two different types of risky behavior. These were, "You adhere to the implementation of the consumption plan under any circumstances," and "You handle unexpected expenses by borrowing" (Lown, 2011). Students were invited to indicate on a five-point scale from 1 (strongly disagree) to 5 (strongly agree) the extent to which they agreed with these two items. Borrowing is not regarded a risky financial behavior if there is a guarantee associated with the money borrowed. Considering that the assets of adolescents are always very limited, and the income of the majority of Hong Kong adolescents is generated from a non-employment-based allowance, their repayment capability is generally beyond their own control. Therefore, handling unexpected expenses by borrowing can be seen as a risky financial behavior in Hong Kong adolescents.

Healthy Financial Behaviors. We assessed healthy financial behaviors by inviting students to indicate on a five-point scale from 1 (strongly disagree) to 5 (strongly agree) the extent to which they performed six healthy financial behaviors: saving regularly, tracking monthly expenses, spending within a budget, keeping an adequate balance in their bank account, saving for an emergency, and saving for the future (Shim et al., 2010; Xiao et al., 2009). The internal consistency of the pretest and posttest scores here were 0.90 and 0.93, respectively. Healthy financial behaviors were calculated by adding the scores of six positive items.

Financial Autonomy. Financial autonomy was measured by using 10 items developed by Micarello et al. (2012). Sample items include: "I like to research prices whenever I buy something," and "I keep an eye open for promotions and discounts." Responses were calibrated on afour-point scale ranging from 1 (strongly disagree) to 4 (strongly agree). The internal consistency of the pretest and posttest scores for financial autonomy were 0.81 and 0.86, respectively. Financial autonomy for both waves was calculated by adding the scores of 10 items.

Background Variables. Students were invited to report their age, gender, family poverty status, education level of each parent (father and mother), living arrangement of parents, and economic status of each parent. For gender, male students were coded as 1, and female students were coded as 0. For poverty status, the families receiving CSSA were coded as 1 (poor families), and all other families were coded as 0 (families that were not poor). The education levels of each parent were obtained by asking students to choose from eight parental education options from 0 (no formal education) to 8 (postgraduate degree). The parental highest education levels were obtained by comparing the education level of father and mother. For living arrangement of parents, students whose parents lived together were coded as 1, and all

others were coded as 0. For economic status of father, students whose father had a full-time job were coded as 1, and all others were coded as 0. For economic status of mother, students whose mother had a full-time job were coded as 1, and all others were coded as 0.

Data Analyses

We first calculated the percentages of overconfident, underconfident, competent, and naive participants in the final sample A. Then, we performed one-way Analysis of Variance (ANOVA) to check if the mean scores were significantly different across four financial literacy types for the first risky financial behavior, the second risky financial behavior, healthy financial behaviors, and financial autonomy. The Bonferroni post hoc comparisons were conducted to further check the origin of the significant difference, if found.

Weighted Least-Squares regressions (WLS), where the regression standard errors were clustered by schools, were performed for risky financial behaviors, healthy financial behaviors, and financial autonomy for the four combinations of knowledge and confidence, respectively. A series of background variables consisting of age, gender, family poverty status, parental highest education, living arrangement of parents, and economic status of each parent were controlled, as literature indicates they were significantly associated with the financial behaviors among adolescents and emerging adults (Deenanath et al., 2019; Shim et al., 2010; Szendrey & Fiala, 2018; Xiao et al., 2015; Zhu, 2018).

At the next stage, we conducted four Weighted Logistic Regression (WLR) analyses where the regression standard errors were clustered by school to evaluate the extent to which our financial education intervention had transformed the status of overconfidence, underconfidence, competence, and naivete, while controlling for the baseline status. For the post hoc analysis, WLS regressions, where the regression standard errors were clustered by school, were performed to assess how the financial education had affected the objective and subjective financial knowledge of students with the four combinations of knowledge and confidence (as categorized from the pretest data) and controlling for baseline scores.

Results

In the final sample A, 33.0%, 11.7%, 38.3%, and 17% of students were grouped into financial literacy overconfidence, underconfidence, competence, and naïvete, respectively. The one-way ANOVA results showed the mean scores of the first risky financial behavior were significantly different across four financial literacy types ($F = 2.957$, $p < .05$). The significant difference was also found for the second risky financial behavior ($F = 6.160$, $p < .01$), healthy financial behaviors ($F = 3.472$, $p < .05$), and financial autonomy ($F = 9.402$, $p < .01$).

The Bonferroni post hoc comparison found that the significant difference of the mean scores of the first risky financial behavior across groups could be attributed to the significant difference between the mean scores of the overconfident and of the underconfident (mean difference = 0.567, $p < .05$). For the second risky financial behavior, the significant difference across groups could be attributed to the significant difference between the overconfident and the underconfident (mean difference = 0.745, $p < .05$), and the significant difference between the overconfident and the competent (mean difference = 0.606, $p < .01$). For healthy financial behaviors, the significant difference across groups could be attributed to the significant difference between the competent and the naïve (mean difference = 2.851, $p < .05$). For financial autonomy, the significant difference across groups could be attributed to the significant difference between the overconfident and the underconfident (mean difference = 2.906, $p < .05$), the significant difference between the overconfident and the naïve (mean difference = 3.900, $p < .01$), and the significant difference between the competent and the naïve (mean difference = 2.997, $p < .01$).

The results of the WLS are presented in Tables 2 and 3. It is evident that overconfident adolescents were more likely to perform risky financial behaviors such as sticking to consumption plans no matter what the circumstances ($B = 0.296$, $p < .01$) and resorting to loans to address unexpected expenses ($B = 0.515$, $p < .05$). Overconfident individuals also showed higher levels of financial autonomy ($B = 1.962$, $p < .01$), while underconfident individuals showed lower levels of financial autonomy ($B = -1.566$, $p < .05$). The WLS results do not report a significant effect of financial literacy overconfidence on healthy financial behaviors. It is evident that family social and economic status was a significant predictor of healthy financial behaviors; those living in nonpoor families and those living with well-educated parents were more likely to engage in healthy financial behaviors.

TABLE 2. Weighted Least-Squares Estimates of the Determinants of Risky Financial Behaviors

	Adhering to theImplementation of the ConsumptionPlan Under Any Circumstances				**Handling Unexpected Expenses by Borrowing**			
Age	−0.065	−0.029	−0.020	−0.026	0.166	0.226	0.217	0.156*
	(0.074)	(0.072)	(0.082)	(0.086)	(0.110)	(0.093)	(0.105)	(0.083)
Male	0.194	0.192	0.207	0.212	0.294	0.294	0.324	0.317
	(0.164)	(0.194)	(0.183)	(0.175)	(0.129)	(0.150)	(0.160)	(0.163)
Poverty	0.145	0.120	0.142	0.121	0.190	0.153	0.242	0.194
	(0.207)	(0.216)	(0.214)	(0.185)	(0.255)	(0.216)	(0.332)	(0.275)
Poverty (no answer)	0.056	0.236	0.238	0.229	0.374	0.674	0.517	0.738
	(0.516)	(0.518)	(0.544)	(0.540)	(0.478)	(0.355)	(0.474)	(0.337)
Parental highest education	0.047	0.056	0.053	0.059	0.001	0.015	−0.007	0.009
	(0.042)	(0.040)	(0.040)	(0.042)	(0.026)	(0.021)	(0.029)	(0.020)
Parents living together	−0.055	−0.036	−0.057	−0.088	−0.159	−0.128	−0.146	−0.130
	(0.343)	(0.293)	(0.301)	(0.320)	(0.212)	(0.154)	(0.163)	(0.128)
Father with full-time job	−0.007	−0.035	0.003	0.015	0.431	0.371	0.485	0.424
	(0.235)	(0.237)	(0.254)	(0.251)	(0.243)	(0.251)	(0.306)	(0.276)
Mother with full-time job	−0.229	−0.213	−0.215	−0.222	0.003	0.025	0.019	0.032
	(0.090)	(0.097)	(0.095)	(0.091)	(0.131)	(0.194)	(0.138)	(0.015)
Financial literacy overconfidence	**0.296****				**0.515***			
	(0.056)				**(0.194)**			
Financial literacy underconfidence		−0.204				−0.370		
		(0.235)				(0.273)		
Financial literacy competence			−0.039				−0.417	
			(0.058)				(0.230)	
Financial literacy naivete				0.215				0.264
				(0.174)				(0.164)
R^2	0.099	0.086	0.081	0.087	0.135	0.106	0.125	0.101

Note. $N = 282$. Robust standard errors (clustered by schools) are reported in parentheses.
* $p < .05$. ** $p < .01$.

TABLE 3. Weighted Least-Squares Estimates of the Determinants of Healthy Financial Behaviors

	Healthy Financial Behaviors				Financial Autonomy			
Age	0.004	−0.065	0.034	−0.097	−0.250	−0.036	0.033	−0.058
	(0.368)	(0.404)	(0.352)	(0.380)	(0.356)	(0.369)	(0.375)	(0.278)
Male	0.803	0.766	0.761	0.814	0.799	0.731	0.876	0.931
	(0.848)	(0.912)	(0.835)	(0.746)	(0.500)	(0.656)	(0.560)	(0.399)
Poverty	−0.573	-0.565	−0.826	−0.653	0.162	0.021	0.120	−0.096
	(1.420)	(1.358)	(1.495)	(1.508)	(1.300)	(1.357)	(1.441)	(1.497)
Poverty (no answer)	**−2.895****	**−3.167****	**−2.573***	**−3.303****	0.999	4.545	1.744	1.341
	(0.446)	**(0.559)**	**(0.660)**	**(0.598)**	(1.303)	(2.040)	(1.063)	(0.846)
Parental highest education	**0.630***	**0.621***	**0.683****	**0.639***	−0.087	−0.039	−0.045	−0.010
	(0.190)	**(0.197)**	**(0.163)**	**(0.194)**	(0.208)	(0.204)	(0.194)	(0.179)
Parents living together	0.804	0.837	0.731	0.604	0.363	0.531	0.399	0.048
	(1.183)	(1.116)	(1.255)	(1.444)	(0.708)	(0.714)	(0.676)	(0.074)
Father with full-time job	0.174	0.125	0.054	0.256	0.448	0.296	0.544	0.659
	(0.862)	(0.751)	(0.941)	(0.899)	(1.250)	(1.292)	(1.191)	(1.158)
Mother with full-time job	−0.612	−0.627	−0.601	−0.668	−0.112	0.006	0.001	−0.068
	(0.676)	(0.685)	(0.688)	(0.714)	(0.449)	(0.480)	(0.428)	(0.465)
Financial literacy overconfidence	−0.374				**1.962****			
	(0.593)				**(0.295)**			
Financial literacy under-confidence		−0.239				**−1.566***		
		(1.000)				**(0.507)**		
Financial literacy competence			1.197				0.080	
			(0.874)				(0.517)	
Financial literacy naivete				−1.273				**−2.039***
				(0.737)				**(0.653)**
R^2	0.110	0.110	0.123	0.118	0.083	0.055	0.042	0.070

Note. $N = 282$. Robust standard errors (clustered by schools) are reported in parentheses.
* $p < .05$. ** $p < .01$.

Table 4 presents the WLR results for financial education as predicting the four combinations of knowledge and confidence. When estimating robust standard errors clustered by schools and controlling for baseline status, we noticed that the financial education project affected significantly only the status of financial literacy underconfidence by increasing its likelihood (OR = 1.907, $p < .01$). The WLS results presented in Table 5 further indicate that for those categorized as overconfident at the baseline, financial education was able to reduce their subjective financial knowledge (B = −0.703, $p < .01$). For those grouped as underconfident, financial education could promote both their objective and subjective financial knowledge (B = 6.900, $p < .05$; B = 1.201, $p < .01$). For those considered competent in financial literacy, the financial education improved their objective financial knowledge, but decreased their subjective financial knowledge (B = 1.567, $p < .05$; B = −0.500, $p < .05$).

Discussion

The match and mismatch between objective and subjective financial knowledge have received little research attention among adolescents. This study categorized a sample of Hong Kong adolescents as being either financial literacy overconfident, underconfident, competent, or naïve, and as far as we know, is the first study to examine this topic among adolescents. The prevalence of overconfidence was relatively high among the sampled Hong Kong adolescents, and seems higher than that in adult samples from the United States, China, and Holland (Kramer, 2014; Porto & Xiao, 2016; Xia et al., 2014). Similar to the findings in previous adult samples, we noticed that among the four types, financial literacy overconfidence has drawn the most attention from academies and practitioners.

Just as overconfidence regarding financial literacy plays an important role in adults by positively predicting risky and costly borrowing behaviors (e.g., pay-day loans and tax advances), so is overconfidence in adolescents associated with a high likelihood of falling into debt, which includes sticking to consumption plans without a comprehensive assessment of personal financial status and borrowing money to address unexpected expenses (Tokar Asaad, 2015). Similar to findings with the adult sample that highlight the positive role of financial literacy overconfidence in promoting active participation in stock transactions, this study indicates that financial literacy overconfidence can increase the financial autonomy of adolescents (Xia et al., 2014). Previous studies targeting adults did not record any effect of the mismatch between financial knowledge and confidence on healthy financial habits such as saving and budgeting. Likewise, our research showed that neither overconfidence nor underconfidence had significant associations with the healthy financial behaviors of adolescents. Echoing research that investigated the development of financial behaviors during adolescence, it was shown that financial behaviors are shaped by the family's social and economic status through a complex procedure of socialization (Zhu, 2018). Therefore, our Hypothesis 1 is partially supported and Hypothesis 2 is fully supported. Financial literacy overconfidence in adolescents and adults are very close in nature: on the one hand, overconfidence can be seen as a negative psychological state that motivates risky financial engagement; but on another hand, it is positive and should be encouraged, as overconfident adolescents seem to be more financially independent and involved in actively managing their personal finances through financial participation. Because technology advancements continue to create opportunities for adolescents to engage in financial activities, studying the association between objective and subjective financial knowledge will become even more necessary and demanding. In the context where most of the literature investigating the financial capacity of adolescents has concentrated on either knowledge or confidence (Amagir et al., 2018), this study is expected to initiate a new research field that will contribute directly to adolescents' quality of life and general well-being.

The WLR results show that the financial education did not impact overconfidence, competence, or naivete, but only affected underconfidence. Underconfidence can be seen as a negative psychological state in adolescents as it is shown to reduce their financial autonomy. We are aware that our financial education had an apparently negative effect in that it was found to increase the prevalence of financial literacy under-confidence. Results indicate that our Hypothesis 3 is not supported.

Thankfully, the financial courses were found to reduce the confidence of those tagged as overconfident and to promote confidence among those labelled underconfident. We are glad to see that our financial project was able to improve the level of objective financial knowledge of adolescents, although the positive effect was not universal and was only detected in those grouped as financial literacy

TABLE 4. Weighted Logistic Regression Results for Financial Education Predicting Mismatch Between Financial Knowledge and Confidence

	Overconfident T2	Underconfident T2	Competent T2	Naive T2
Financial education	0.377	**1.907****	1.381	0.874
Overconfident T1	**7.671***			
Underconfident T1		**2.231****		
Competent T1			**4.748***	
Naive T1				**3.878****
McFadden R^2	0.187	0.035	0.095	0.049

Note. N = 220. Odds Ratios (*OR*) are reported. Robust standard errors were clustered by schools.
T1 = Pretest, T2 = Posttest.
* $p < .05$. ** $p < .01$.

TABLE 5. Weighted Least-Squares Estimates of Financial Education Predicting Financial Knowledge and Confidence

	Overconfident T1		Underconfident T1		Competent T1		Naive T1	
	OFK T2	SFK T2	OFK T2	SFK T2	OFK T2	SFK T2	OFK T2	SFK T2
Financial education	2.377 (1.026)	**−0.703**** **(0.120)**	**6.900*** **(1.664)**	**1.201**** **(0.157)**	**1.567*** **(0.401)**	**−0.500*** **(0.147)**	0.613 (1.904)	−0.228 (0.484)
OFK T1	0.822 (0.367)		0.251 (0.541)		**0.774*** **(0.186)**		0.664 (0.224)	
SFK T1		**0.299**** **(0.061)**		−0.299 (0.292)		**0.537*** **(0.150)**		−0.222 (0.123)
R^2	0.246	0.103	0.257	0.192	0.138	0.127	0.182	0.033
Sample size	n = 78		n = 25		n = 77		n = 42	

Note. Robust standard errors (clustered by schools) are reported in parentheses. OFK = objective financial knowledge; SFK = subjective financial knowledge;T1 = Pretest; T2 = Posttest.
* $p < .05$. ** $p < .01$.

underconfident and competent. Another piece of evidence highlights the negative effect of the course design: surprisingly, our financial course reduced the confidence of those considered competent in financial literacy. We are forced to believe that the course content might be too difficult, and that this may disappoint excellent students and increase the likelihood of underconfidence. However, this alone cannot strongly motivate for the revision of the current design as a difficult course can remind the overconfident students that their confidence is indeed over-estimated.

Limitations

Although this study fills an important gap in financial literacy studies by improving the understanding of financial literacy overconfidence in adolescents, some limitations must be acknowledged when evaluating the findings. First, the evaluation of the impact of a mismatch between knowledge and confidence on financial behavior depended on cross-sectional data, which limited the establishment of casual relationships. Second, the sample size in the control group was relatively small; we recommend a balanced number of students in the experimental and control groups in future studies. Third, we adopted single-items to measure two risky financial behaviors in adolescents, and this should be addressed in future studies by developing new scales with good psychometric properties.

Implications

This study adds new knowledge regarding financial literacy types by extending its significance to adolescents. Overconfidence can be described as either positive or negative among adolescents depending on the specific financial field, as happens in the adult world. Therefore, financial counselors and educators should direct the financial behaviors

of youth according to different occasions: these could be summarized as requiring bold and confident participation in personal financial management, but cautious handling of sensitive situations, such as borrowing money. In addition, this study offers a new logic by which to judge whether a financial education project is effective. An effective course is one that successfully responds to the unique needs of students who are grouped according to their different combinations of financial knowledge and confidence. A course that is effective for one group of students might be ineffective for another.

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