

M.Sc.

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“Please Love Me: An Integrated Model of Online Dating and Mental
Well-Being in Times of COVID-19”

Leonie Spitzer

S1804642

Graduation committee:

Dr. Tessa Dekkers

Dr. Peter ten Klooster

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University of Twente

P.O. Box 217

7500 AE Enschede

The Netherlands

Abstract

Background. The novel SARS-CoV-2 coronavirus has affected the social lives of young people and especially the opportunities for romantic encounters, leading to an increase in the popularity of online dating applications. However, it has been pointed out that these applications may have created an adverse environment that impacts users' mental well-being. Yet, this has not been empirically examined in the context of online dating during COVID-19.

Objective. The aim of this study was to examine the extent to which online dating use is related to users' mental well-being and whether this relationship is mediated by self-objectification, socio-cultural attitudes, and/or body dissatisfaction.

Method. A secondary analysis of data collected in a cross-sectional survey design was conducted using data of 131 students, aged 18 to 44, that previously participated in a survey study on online dating and mental well-being. The Mental Health Continuum-Short Form, the Self-Objectification Questionnaire, the Sociocultural Attitudes Towards Appearance Scale-4, and the Body Satisfaction Scale was used. The hypothesized multiple mediation model was tested using a bootstrapping approach (PROCESS, model 4).

Results. Being an online dating user was significantly negatively associated with mental well-being ($b = -7.95$, 95%CI [-12.2, -3.75], $p = 0.001$), with self-objectification ($b = 5.67$, CI [0.86, 10.5], $p = 0.02$) and the internalization of socio-cultural attitudes ($b = 3.75$, CI [0.14, 7.37], $p = 0.04$). In the multiple mediation analysis, only self-objectification (M_1), was found to have a significant negative indirect effect of online dating use on mental well-being $b = -1.63$, 95% CI [- 3.73, -0.15], $R^2 = 0.93$. No significant indirect effects were found for socio-cultural attitudes (M_2) and body dissatisfaction (M_3).

Conclusion and Discussion. This study supports that online dating applications have created an adverse environment which is negatively associated with mental well-being. A significant negative association between online dating use and mental well-being, higher levels of self-objectification and internalized socio-cultural attitudes for online dating users were observed. Empirical support is provided that self-objectification persists as a critical explanatory factor to understand the relationship between online dating use and mental well-being. Insights on the underlying mechanisms enhance the understanding of mental health risks, and have the potential to inform both online dating application providers on how to design applications. Lastly, the need for future research to examine to what extent the findings are applicable to People of Color, to sexual and gender minorities, as well as for research examining additional underlying mechanisms playing a role in users' mental well-being is highlighted.

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Introduction

The COVID-19 pandemic has been causing one of the world's largest economic crises, brought about dramatic social changes, and has affected the overall well-being of individuals (Lindberg, Bell & Kantor, 2020). The novel SARS-CoV-2 coronavirus first broke out in December 2019 and has spread rapidly worldwide since the beginning of 2020 (Doering, 2020). Since then, the primary goal has been to slow down the spread of the virus, which is transmitted by direct and contact transmission. Thus, by Spring 2020, more than half of the world population was in lockdown and other safety restrictions such as travel restrictions, curfews, and contact bans have been taken (Sandford, 2020). These widespread social shifts have been affecting the mental well-being of individuals, influencing romantic and sexual relationships and thus especially the lifestyle of singles and adolescents (Doering, 2020). Social distancing and stay-at-home requirements have reduced the possibilities of meeting potential romantic and/or sexual partners in real life and especially sexual interactions have been largely prohibited by the pandemic mitigation measures (Lindberg, Bell & Kantor, 2020). To get in contact with possible partners nevertheless and possibly exchange intimate feelings without meeting up physically, the use of online dating applications has been one of the few remaining options. This paper explores online dating use during the pandemic, especially in relation to well-being.

To start with, online dating applications are software applications designed to generate connections between people who are interested in romance, casual sex, or friendship. Downloaded onto mobile phones, they feature algorithms based on factors like age, gender of the user and desired partner, and the distance users need to travel to meet one another (Orchard, 2019). They emerged in 2003 and became increasingly popular between 2007 and 2008 with the introduction of the Apple iPhone and the first App Store (Quinoz, 2013). Since then, many more suppliers have accessed the market such as Tinder, OkCupid, Bumble, Hinge, and Grindr, providing more user-friendly designs and additional features making the dating experience mobile (Orchard, 2019). In 2020, 320.3 million people were using one or more online dating applications worldwide, and an increase by 4.3% to 370.1 million users in 2021 is expected by the Statista Market Forecast (Statista, 2020). This is supported by a study by Anderson et al. (2020) where the majority (57%) of American users reported to have mostly positive experiences with online dating platforms. Research also shows that online dating is especially popular among younger adults and those who identify as lesbian, gay, bisexual, trans, queer, intersex (LGBTQI+) (Anderson et al., 2020).

Next to their inherent benefits, however, online dating applications have been identified to create an adverse environment that may impact users' mental well-being. Well-being itself describes feelings of happiness and a sense of purpose which can remain even in the presence of mental illness, distress, or suffering (Keyes, 2005). Yet, research has pointed out several risks of online dating applications on mental well-being, including increased psychological distress, depression, and anxiety (Holzhausen et al., 2020), body consciousness, body shame, drive for thinness, low self-esteem

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(Holland & Tiggemann, 2016), appearance and esteem-related problems (Strubel & Petrie, 2017). This relationship between online dating and mental well-being may be explained through Objectification Theory (Fredrickson & Roberts, 1997) and Sociocultural Theory (Thompson et al., 1999) which are briefly presented below.

Objectification theory originally stems from research on women growing up in western cultures, being exposed to the objectification of women's bodies through media, culture, education, or interpersonal interactions (Fredrickson & Roberts, 1997). Fredrickson and Roberts (1997) proposed Objectification Theory to illuminate how cultural objectification experiences affect women psychologically and propose that when objectified, women are treated as bodies that exist for the use and pleasure of others. This leads a woman to adopt a third-person perspective and to focus on the observable physical attributes of herself (Noll & Fredrickson, 1998). By internalizing an observer's perspective and sociocultural standards of attractiveness as a primary view of the self, women may lose access to their own inner physical experiences. This has been related to negative consequences and harmful effects on physical and psychological well-being, such as excessive body surveillance, negative eating attitudes, low self-esteem, and depressive symptomology (Calogero, Tantleff Dunn & Thompson, 2011; Fredrickson & Roberts, 1997; Moradi & Huang, 2008).

Following this theory, online dating applications may create an objectifying environment. By offering access to a large pool of potential partners which are nonstop available, an evaluative, assessment-oriented mindset is elicited that leads online daters to objectify potential partners and the self (Finkel et al., 2012). Having the goal of matching with potential partners, users may attempt to please and comply with the conceptions of other people. Bartky (1990) called this process the "becoming an object of others pleasure", whereas Talmon and Ginzburg (2016) pointed out the threat of losing one's sense of subjectivity and autonomy. Among others, severe consequences such as increased body shame, poorer self-esteem, depression, insensitivity to bodily cues, and decreased sexual functioning have been reported (Breines, Crocker, & Garcia, 2008; Szymanski & Henning, 2007; Tiggemann & Slater, 2001). Therefore, self-objectification is theorized to contribute to the negative association with users' mental well-being in the context of online dating.

Another framework for understanding the relationship between online dating and lower mental well-being is provided by Sociocultural Theory. Interwoven with Objectification Theory, Sociocultural Theory (Thompson et al., 1999) suggests that individuals internalize traditional media's portrayal of beauty ideals and engage in appearance comparisons with them. The internalization describes a process by which individuals desire specific socially constructed ideals and consequently take actions to attain these ideals. Here, possessing an ideal body is associated with positive states such as happiness or success (Thompson et al., 1999). Depending on each individual and the cultural background, these ideals may differ in form, e.g., ideals relevant to men (muscular ideal) or women (thin ideal). The pressure to conform to these ideals might further have different sources such as peers,

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family, and/ or the media. However, as these contemporary beauty ideals are almost invariably impossible to achieve, research shows that exposure to these ideals is related to growing body dissatisfaction, ultimately affecting individuals' mental well-being (Ata et al., 2006; Keery, Van Den Berg, & Thompson, 2004; Stice, 1994; Tiggemann, 2002).

Sociocultural theory was identified to not only play a role in traditional media, but also in modern Social Networking Sites (SNSs), such as Facebook, Instagram, and Twitter. Recent research points out that there is a link between the internalization of appearance ideals, body dissatisfaction, and SNSs, impacting users' well-being. For instance, results from Holland and Tiggemann's (2016) systematic review provided evidence that SNS use is associated with increased body dissatisfaction across gender. However, up until now, research on the relationship between the internalization of sociocultural ideals and the use of online dating applications is lacking. Similar to SNSs, users of online dating applications are able to create profiles that they use to interact with other users and actively decide how they participate and how they present themselves online (Holland & Tiggemann, 2016). Here, the internalization of ideals might become visible through images that emphasize the appearance, stressing certain body parts and sexual function by using seductive, sexy, and suggestive poses or showing much skin in uploaded pictures and selfies (Chua & Chang, 2016). Thus, according to sociocultural theory and research on SNSs, it is theorized that the internalization of socio-cultural attitudes and body dissatisfaction are contributing to the negative effect on users' mental well-being. However, as dating applications also differ from SNS's regarding the motivation of use and provided features, the lack of research in this field calls for a thorough examination of these relationships in the context of online dating.

This study

In sum, the novel coronavirus has affected the social lives of young people and especially the opportunities for romantic encounters, leading to an increase in popularity of online dating applications. However, it has been pointed out that these applications have created an adverse environment that impacts users' mental well-being. This relationship between online dating and mental well-being may be explained through Objectification Theory (Fredrickson & Roberts, 1997) and Sociocultural Theory (Thompson et al., 1999). However, these have not been empirically examined simultaneously in the context of online dating during COVID. Thus, the aim of this study is to examine the extent to which online dating use is related to users' mental well-being and whether this relationship is mediated by self-objectification, socio-cultural attitudes, and/or body dissatisfaction. Doing so may help to better understand the impact and pathways of online dating on the well-being of the many people that use it. In pursuit of this aim, a secondary analysis of data collected in a cross-sectional survey design was conducted. Existing data of 131 young adults that previously participated in a survey study on online dating and mental well-being was used.

Methods

3.1 Study Design

The study is based on a secondary analysis of previously collected quantitative data of a large cross-sectional survey study on online dating and mental well-being conducted by students of the University of Twente (see for example Faesing, 2020; Sanhai, 2020). The University of Twente BMS ethical commission approved the research (09.04.2021; application number: 210578).

3.2 Data collection

3.2.1 Participants and Recruitment

Participants were recruited by means of convenience sampling via the University of Twente Behavioral Management Sciences (BMS) subject pool as well as via personal networks of the researchers. Inclusion criteria were a minimum age of 18 years and sufficient English language skills. Participants who indicated that they used online dating services before but were not currently using them were excluded as this data was not considered relevant for the current study aim, which compares non-use to active use. This resulted in a final sample consisting of 131 participants (Men = 35.1%; women =64.9%) who completed the questionnaire. Most participants' sexual orientation was heterosexual (N= 87.8%), a minor number of participants identified themselves as bisexual (N= 7.6%), and only one individual was gay/lesbian. Participants' age ranged from 18 to 44 with a mean age of 22.73 (SD= 3.78) and whilst the majority was of German nationality (N=71.8%), some were Dutch (7.6%) and 20.6% indicated to have other nationalities.

3.2.2 Procedure

3.2.3 Materials

Participants completed a 30-minute online survey on online dating (for a complete description of all questionnaires in the survey, see Appendix B). However, for the scope and aim of this report, only the following scales are relevant: the *Mental Health Continuum-Short Form (MHC-SF)*, the *Self-Objectification Questionnaire (SOQ)*, the *Sociocultural Attitudes Towards Appearance Scale-4*, and lastly the *Body satisfaction scale*. At the start of the survey, subjects were asked to report their use of online dating applications by indicating whether they have currently used it, used it in the past, or never have used it. Online dating use was categorized into (a) online dating use and (b) no online dating use. Past use participants were eliminated from the sample.

3.2.4 Scales

Mental Health Continuum-Short Form (MHC-SF). To measure participants' mental well-being, the MHC-SF was used (Lamers et al., 2011). The questionnaire consists of 14 items testing three aspects

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of wellbeing; *emotional well-being* (e.g., ‘In the past month, how often did you feel happy?’), *social well-being* (e.g., ‘In the past month, how often did you feel that you belong to a community?’), and *psychological well-being* (e.g., ‘In the past month, how often did you feel confident to think or express your own ideas and opinion?’). All items were rated by use of a 6-point Likert-type scale, a score of 1 indicating ‘never’ up to a score of 6 indicating ‘every day’. The total score was used to assess mental well-being, with low scores indicating low well-being and high scores indicating high well-being. Previous psychometric research revealed that the properties of the MHC-SF have good validity and internal reliability (Lamers et al., 2011). In the current study, the total scale showed an excellent Cronbach’s alpha of .91.

Self-Objectification Questionnaire. To measure the extent to which participants self-objectify, the 10 item SOQ by Noll and Fredrickson (1998) was used. Subjects had to rate items based on the relevance to their own physical self-concept. Items were divided into two categories, appearance-based items (weight, sex appeal, muscle tone, physical attractiveness, measurements [e.g., chest, waist, hips]) and competence-based items (physical coordination, health, muscular strength, physical fitness, physical energy level). To calculate the final self-objectification score, the sum of competence items was subtracted from the sum of appearance items. The final score ranges between -25 and 25, with higher scores indicating greater self-objectification (Noll & Frederickson, 1998). In previous studies, the scale demonstrated good internal consistency with a Cronbach’s alpha of .76 to .89 in a sample of college students (McKinley & Hyde, 1996).

Sociocultural Attitudes Towards Appearance Scale-4 (SATAQ-4). To measure the internalization of appearance ideals (i.e., personal acceptance of societal ideals) and appearance pressures (i.e., pressures to achieve the societal ideal) the SATAQ-4 was used. The questionnaire consists of 14 items testing three dimensions: *Internalization – Thin/Low body fat* “I want my body to look very thin”, *Internalization – Muscular/Athletic* “It is important to me to look athletic” and *Media Pressure* “I feel pressure from the media to improve my appearance”. All items were ranked using a 5-point Likert-type scale, 1 indicating ‘definitely disagree’ and 6 ‘definitely agree’. Each scale score was calculated individually, with high scores indicating greater internalization of appearance ideals/ appearance pressure. Previous psychometric research revealed that the properties of the SATQ-4 have excellent reliability at .85 or higher and good construct validity. In the current study, the scale showed a good Cronbach’s alpha of 0.83.

Body satisfaction scale. Body dissatisfaction was measured using the body-cathexis scale of Secord and Jourard (1953), which is a simply designed scale where participants rate their satisfaction concerning 16 body parts (e.g. face, chest, legs, head) based on a rating of a 7-point Likert-type scale, ranging from 1 ‘very satisfied’ to 7 ‘very unsatisfied’ (Slade, Dewey, Newton, Brodie, & Kiemle, 1990). The total score consists of the mean of all 16 items, with higher scores indicating a high degree

of body dissatisfaction. Concerning this study, the internal consistency was found to be good with a Cronbach's alpha of .87.

3.3 Data Analysis

Data analysis was conducted using IBM SPSS Statistics 26. Prior to conducting any type of analysis, basic data screening activities were conducted to ensure the accuracy of data entry and to assess the normality of the data. Descriptive statistics (frequencies, means, standard deviations) were used to explore the demographics and the variables of interest. Data were checked for missing and erroneous data, resulting in eleven outliers that were deleted from the dataset. Regarding the levels of measurement, the independent variable online dating use was coded as a dummy variable (0=no use and 1= use). All mediating variables and the dependent variable are continuous and measured at the interval level of measurement or higher.

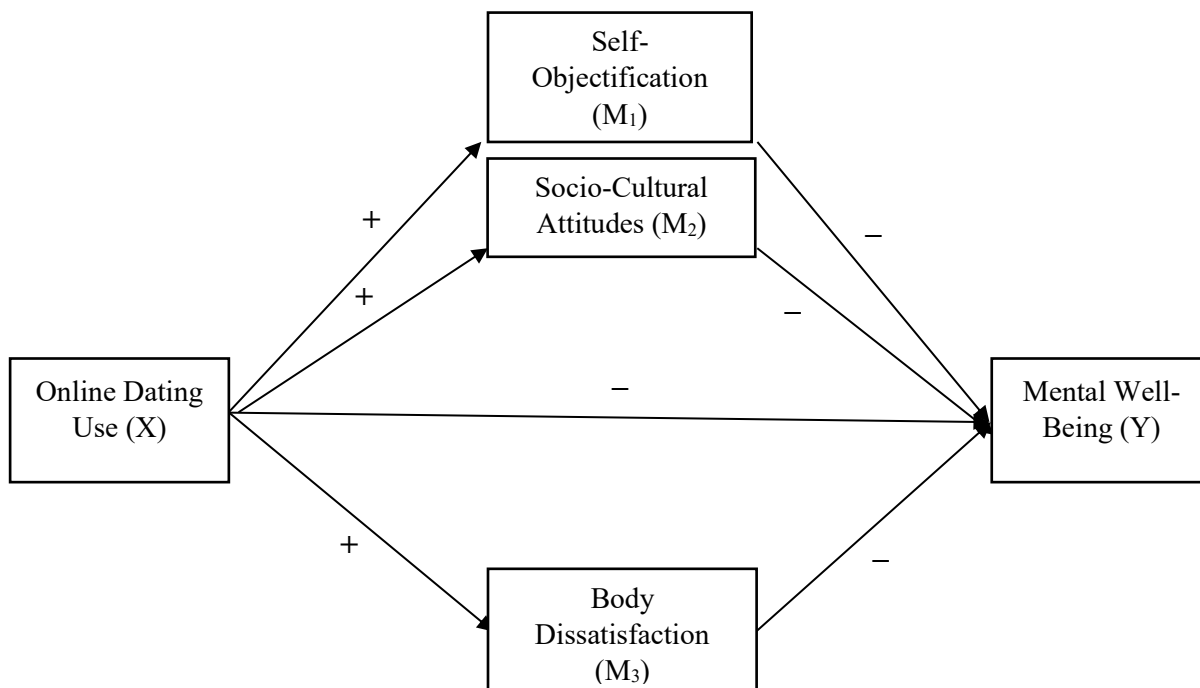
As mediation analysis relies on a linear regression analysis, the mediating variables follow the same set of assumptions required by regression analysis which include the level of measurement, linearity, homoscedasticity, and normality of errors. To evaluate normality of the variables, normality tests (Kolmogorov Smirnov and Shapiro-Wilks) were conducted. To check for the linearity of relationships and the degree of association between two variables, univariate Pearson's correlation coefficients and the corresponding scatterplots were inspected. To evaluate the assumption of homoscedasticity, the independent variable, the mediating and dependent variables are required to be normally distributed. Thus, the scatter plot for the residuals (errors) against the predicted values was inspected. Finally, to check for the normal distribution of errors, the histogram and normality plots for the residuals (errors) were inspected (Abu-Bader & Jones, 2021). No violations were found for the chosen variables; hence it was presumed with a multiple mediation analysis.

A multiple mediation Model (PROCESS, Model 4; Hayes & Preacher, 2013) was tested to examine to what extent self-objectification, socio-cultural attitudes, and body satisfaction mediate the relationship between online dating application use and mental well-being. The model (see Figure 1) was tested using a bootstrapping approach to assess the significance of the indirect effects at differing levels of the mediators (Hayes & Preacher, 2013). Online dating use was used as the dichotomous predictor variable, the outcome variable was mental well-being whereas self-objectification, socio-cultural attitudes, and body satisfaction were the proposed mediators. The "PROCESS" macro used a bootstrapping method with 5000 bootstrap resamples and bias-corrected confidence estimates which provides additional statistical power as it allows for resampling of a large number of small samples (Preacher & Hayes, 2004). The direct and indirect effects are considered significant at $p < .05$ when the respective 95% bootstrapped confidence intervals do not include zero.

Figure 1

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Hypothesized multiple mediation model of online dating use on mental well-being with three mediators



Note. +/- = hypothesis direction, indicating a positive/ negative association between variables

Results

Descriptive statistics and univariate Pearson correlations between all variables are reported in Table 1. Small to moderate correlations between the variables of interest were found. An independent-samples t-test was conducted to compare mental well-being, self-objectification, internalization of socio-cultural attitudes and body dissatisfaction in online dating use and no online dating use condition. There was a significant difference in the scores for mental well-being in the use ($M=52.1$, $SD=23.3$) and no use ($M=60.1$, $SD=11.74$) condition; $t(98)=-3.66$, $p=0.001$. Self-objectification scores were also significantly different ($Use_M=-0.28$, $SD=12.1$, $NoUse_M=-5.93$, $SD=11.9$; $t(98)=2.3$, $p=0.02$), as well as scores on the internalization of socio-cultural attitudes ($Use_M=43.9$, $Use_{SD}=8.7$; $NoUse_M=40.2$, $NoUse_{SD}=9.36$; $t(98)=1.35$, $p=0.04$). No significant difference in the scores for body dissatisfaction were found in the use and no use condition (Table 2).

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Table 1

Summary of the total number of respondents (N), means (M), standard deviations (SD), Pearson correlations

Variable	n	M	SD	1	2	3	4	5
1. Self-objectification	101	-3.29	12.3	-				
2. Socio-cultural attitudes	100	41.9	9.22	0.17	-			
3. Body satisfaction	131	42.8	14.3	0.23*	0.26*	-		
4. Mental well-being	124	56.5	12.6	-0.41**	-0.04	0.49**	-	
5. Online dating use	131	-	-	0.23*	0.21*	0.065	-0.31**	-

* $p < .05$. ** $p < .01$.

Table 2

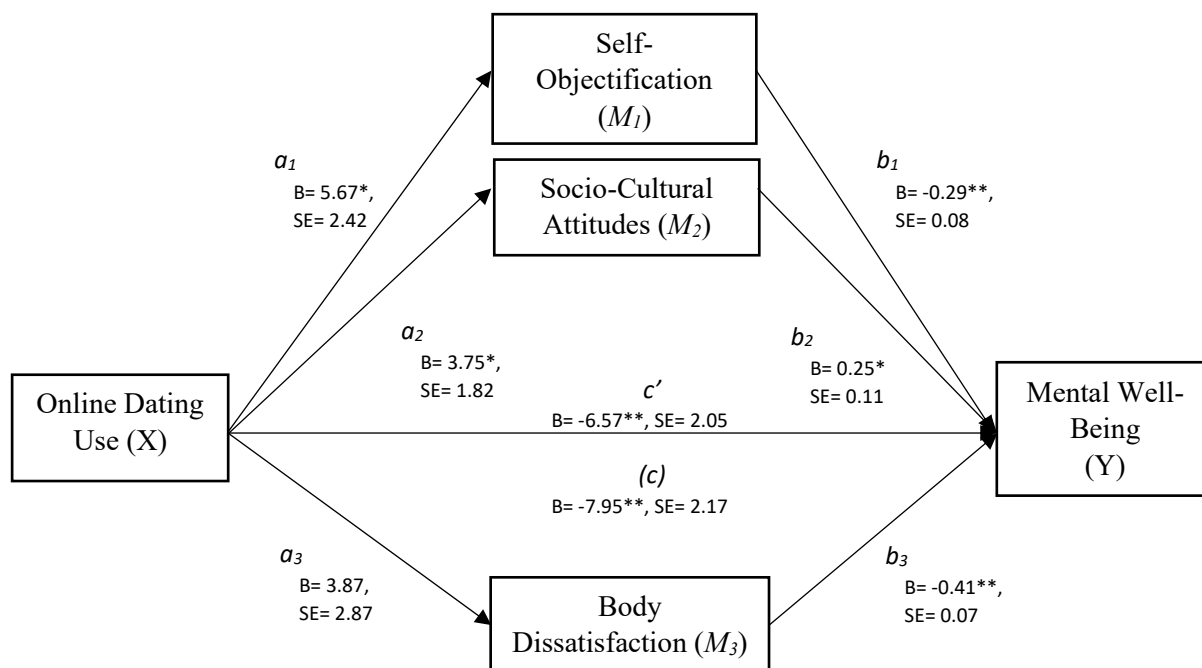
Comparing means with Independent T-Test

Measure	Online dating use		No online dating use		Total		Mean Difference	Std. Error	p-value
	M	SD	M	SD	M	SD			
MHC	52.1	23.3	60.1	11.74	56.6	12.6	-8.86	2.39	0.001
SOBJ	-0.28	12.1	-5.93	11.9	-3.30	12.3	5.66	2.46	0.02
SCA	43.9	8.7	40.2	9.36	41.9	9.28	3.75	0.06	0.04
BSAT	43.9	13.8	42.1	14.7	42.8	14.3	3.87	2.85	0.17

Note. Abbreviations: MHC= mental well-being; SOBJ= Self-objectification; SCA= Socio-cultural attitudes; BSAT= Body dissatisfaction

Figure 2

The path model for multiple mediation analysis



Note. The c coefficient represents the total relationship between online dating use and mental well-being. The c' coefficient represents the strength of the association between online dating use and mental well-being after controlling for the three mediated paths (self-objectification, socio-cultural attitudes, body dissatisfaction). The a and b paths represent the mediated or specific indirect paths involving the hypothesized mediators. * $p < .05$; ** $p < .01$; *** $p < .001$.

Figure 2 shows a visual representation of the results of the multiple mediation model. In step 1 of the mediation model, online dating use was a significant direct predictor of participant's mental well-being (c pathway), $b = -7.95$, $t(131) = -3.67$, $p < .001$, ignoring all mediators. Step 2 showed that the regression of online dating use (X) on the mediator self-objectification (a_1) was also significant, $b = 5.67$, $t(101) = 2.34$, $p < .05$. Furthermore, the regression of online dating use (X) on the mediator socio-cultural attitudes (a_2) was also significant, $b = 3.75$, $t(100) = 2.06$, $p < .05$. However, it was found that the regression of online dating use on the third mediator body dissatisfaction (a_3) was not significant, $b = 3.87$, $t(131) = 1.35$, $p > 0.05$. Step 3 of the mediation process showed that the regression of the mediator (self-objectification), on mental well-being (b_1) was significant, $b = 0.29$, $t(101) = 2.06$, $p < 0.001$. In addition, the regression of the second mediator socio-cultural attitudes on mental well-being (b_2) was also found to be significant, $b = 0.25$, $t(100) = 0.47$, $p < 0.05$. Lastly, the pathway b_3 of the mediator body dissatisfaction on mental well-being was also found to be significant, $b = -0.41$, $t(131) = -5.74$, $p < 0.001$. Step 4 of the analysis revealed that controlling for the mediators (M_1, M_2, M_3), online dating use was still a significant predictor of users' mental well-being, $b = -6.57$, $t(101) = -3.20$, $p < 0.001$. Step 5 of the analysis revealed that only mediator 1 self-objectification ($a_1 b_1$

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pathway) had a negative indirect effect of online dating use on mental well-being, $b = -1.63$, 95% CI [-3.73, -0.15], $R^2 = 0.93$. As the zero falls in both the confidence interval of the a_2b_2 and a_3b_3 pathways, no indirect effects were observed for the mediator socio-cultural attitudes, $b = 0.94$, 95%CI [-0.07, 0.93], $R^2 = 0.60$, and body dissatisfaction, $b = -1.60$, 95% CI [-4.07, 0.76], $R^2 = 1.21$.

Table 4

Path coefficients, indirect effects, and 95% bias-corrected confidence interval of online dating use (X), self-objectification (M1), socio-cultural attitudes towards appearances (M2), body dissatisfaction (M3) predicting mental well-being scores (Y; N= 131)

Path	b	95% CI LL	95%CI UL	SE	t	p-value
Total effect (c)	-7.95	-12.2	-3.75	2.17	-3.67	.000
Direct effect (c')	-6.57	-10.6	-2.50	2.05	-3.20	.000
a_1	5.67	0.86	10.5	2.42	2.34	.021
a_2	3.75	0.14	7.37	1.82	2.06	.042
a_3	3.87	-1.83	9.57	2.87	1.35	.181
b_1	0.29	-0.45	-0.12	0.08	-3.42	.000
b_2	0.25	0.03	0.47	0.28	0.47	.028
b_3	-0.41	-0.56	-0.27	0.07	-5.74	.000
Indirect effects						
Total	-2.29	-5.49	0.71	1.56		
a_1b_1	-1.63	-3.73	-0.15	0.93		
a_2b_2	0.94	-0.07	2.31	0.60		
a_3b_3	-1.60	-4.07	0.76	1.21		

Note. Abbreviations: b= effect; CI = confidence interval; LL = lower limit; UL = upper limit; SE= standard error.

Discussion

Over the past decade, online dating applications have gained popularity and provided alternative means by meeting romantic partners online. Especially during the Covid-19 pandemic, use of online dating applications has surged. However, these applications may have created an adverse environment that impacts users' well-being. Examining this environment helps to understand the impact that online dating has on the lives of many people. Thus, the aim of this study was to examine the relationship between online dating and users' mental well-being and to explore to what extent the relationship is mediated by self-objectification, socio-cultural attitudes, and body dissatisfaction. Confirming theories of previous studies regarding a negative association, the findings showed significant negative effects between online dating use and mental well-being, higher levels of self-objectification and internalized socio-cultural attitudes for online dating users. Partial support was found for the hypothesized mediational mechanisms. Below, further elaboration will be provided on these findings in light of current research and theoretical background. In addition to that, strengths, limitations, practical implications, and recommendations for future research will be discussed.

Firstly, the findings of this study revealed significantly lower well-being scores for online dating users in comparison to non-users. This is of interest as previous research highlighted the positive attributes of online dating, e.g. by being able to promote happiness and to decrease loneliness when experiencing successful encounters (Finkel et al., 2012). It was hypothesized that self-objectification, internalization of socio-cultural attitudes and body satisfaction play a significant role in this relationship, however, after controlling for these mediators, online dating use was still a significant predictor of users' mental well-being. Taking the COVID-19 situation into account, a multitude of factors might be accountable for these low well-being scores. Looking at the results of a study by Kowal et al. (2020) which were based on analyses of data from 53,524 respondents from 26 countries and areas at the start of the pandemic (March and April 2020), evidence is provided that generally higher levels of stress were reported for women, single people and people of younger age. Interestingly, it was revealed that married or cohabiting individuals experience lower levels of stress than single individuals (Kowal et al., 2020). So, even though this study did not take relationship status as such into account, it can be assumed that most individuals who used online dating applications, were single. Thus, long-lasting social isolation might have affected them significantly more, increased feelings of loneliness and ultimately affected levels of anxiety, depression and mental well-being (Odrizola-González et al., 2020). Further research is needed to investigate this finding in detail. Research by Gray et al. (2020) on the influence of the pandemic on mental well-being consequently proposed that mental health services need to prepare for a wave of mental health problems, emphasizing vulnerable groups such as younger adults, women and singles.

Secondly, our findings confirmed the hypothesis that self-objectification accounted for some of the negative association between online dating use and users' mental well-being. In line with

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Objectification Theory (Fredrickson & Roberts, 1997), these findings might be explained by the idea that online dating applications create an objectifying environment. When individuals receive the message that their appearance is more important than what they are capable of doing, they engage in an “objectifying process” (Newall, 2015) where they start internalizing an observer’s perspective which consequently affects, body consciousness, psychological distress and ultimately mental well-being (Finkel et al., 2012). As online dating applications rarely offer the possibility of showing what one is capable of, and one’s whole personality, but only a customized picture of oneself, this process can easily be activated. These findings are somewhat consistent with a study by Anderson et al., (2020), where 71% of American online daters additionally believed that dishonesty is a pervasive issue of online dating applications. They shared the belief that it is very common for people to lie about themselves to appear more desirable and thus to enhance the presented picture (Anderson et., 2020). Taking into account the COVID-19 context, and the omission of alternative means to meet potential partners, the pressure to succeed and to comply with the conceptions of other people might have even increased. Hence, the findings lend preliminary empirical support that self-objectification is related to online dating use and mental well-being which until now had not been comprehensively tested.

The understanding of underlying mechanisms and cultural factors that contribute to mental health risks for individuals has the potential to inform both online dating application providers on how to design applications which try to keep self-objectification as low as possible, as well as users on how to consciously use them. Consequently, design choices which aim at authentically presenting oneself and users’ personality might ultimately decrease self-objectification levels. To illustrate, Bumble, Happn and Hinge introduced the voice prompt feature in October 2021. According to these providers, audio features are adding a new dimension to digital dating. Hinge’s chief product officer Michelle Parson explains that “with the introduction of Voice Prompts, we’re adding more authenticity to the profile experience, allowing users to fully display their personality in a new way” (Love at First Listen: Hinge’s New Voice Prompts Bring Daters’ Profiles to Life, 2021). Here, the focus is shifted from photograph-based swiping to attributes addressing character traits. By focusing on staying in the first-person perspective, it might consequently be possible to keep having access to one’s own inner physical experiences, subjectivity and autonomy. However, if not successful, recent research by Orchard (2019) suggested that users might be experiencing “dating app fatigue” due to the objectification, impermanence, and instability that characterize dating app culture.

Thirdly, in contrast to the hypotheses and socio-cultural theory (Thompson et al., 1999), this study did not find the internalization of socio-cultural attitudes and body dissatisfaction to account for the negative association between online dating use and users’ mental well-being. Interestingly, while online dating users did show higher internalized socio-cultural attitudes, their level of body dissatisfaction was similar to non-user levels. One possible explanation for this observation is offered

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in a study by Halliwell (2013), who reported an interesting relationship between body satisfaction and body appreciation. It was found that women who reported high levels of body appreciation did not report negative media exposure effects. This protective role of body appreciation was also evident for women scoring high on thin-ideal internalization. Similar to negative media exposure effects, it might be that women who report high levels of body appreciation are not affected by exposure to a negative online dating application environment. Thus, regarding future research, it might be of interest to measure body appreciation as a moderating variable. Based on Halliwell's findings, it might even be an effective intervention strategy to protect against negative mental health risks of online dating by promoting positive body images.

Furthermore, internalized socio-cultural attitudes might not have demonstrated a negative effect on individuals' mental health due to a change in how people relate to beauty ideals. Indeed, Tovée et al. (2006) argued that the perception of physical attraction is "plastic" and changes with time and a changing environment. However, thorough scientific research is lacking in this field and calls for investigation in future studies. Until now, changing beauty ideals have only been intensively discussed in both mass media (press, radio, and television) and social media (Facebook, YouTube, Instagram, and Twitter) (Döring & Walter, 2020). Here, a constant change of beauty ideals has been recognized, especially a shift from idealizations of thinness to more inclusive beauty ideals in the past years. According to an article of the National Geographic magazine in 2021 by Givhan and Morales "the new beauty [is] not defined by hairstyles or body shape, by age or skin color. Beauty is becoming less a matter of aesthetics and more about self-awareness, personal swagger, and individuality. It's about chiseled arms and false eyelashes and a lineless forehead. But it's also defined by rounded bellies, shimmering silver hair, and mundane imperfections. Beauty is political correctness, cultural enlightenment, and social justice." (The idea of beauty is always shifting. Today, it's more inclusive than ever., 2021). Thus, future qualitative and longitudinal studies are advised to explore the role of changing beauty ideals and the impact of inclusive and appreciative ideals on adolescents' well-being.

Strengths, limitations and future research

This study represents one of the first studies which explore online dating in the context of a pandemic. Thus, this study adds to the body of literature which focuses on the effects of an all-encompassing crisis, which limits people's options of dating in real life and affects individuals' overall well-being. Furthermore, the methodology of mediation adds to a deeper and more refined understanding of relationships and pathways between online dating use, well-being, body image, and new media, which have not been examined simultaneously before (Wu & Zumbo, 2007). This study also supports Objectification Theory (Fredrickson & Roberts, 1997) and its applicability in the context of online dating. In addition, a statistical strength has been the bootstrapping method which helps reduce bias and provides additional statistical power (Preacher & Hayes, 2004).

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However, some limitations must be considered as well. The sample consisted of a homogenous group of individuals who were mostly German, heterosexual, young and white which is very likely to have impacted the findings in numerous ways. Regarding the generalizability of the results it stays unclear to what extent they are applicable to People of Color, to sexual and gender minorities and to individuals of superior age. Up until now, only very few studies have investigated these associations. Hurtado (1998) for instance, has pointed out that women of color, poor women, and lesbians face additional negatively valenced oppressions of racism, classism, and homophobia which might also additionally affect their mental well-being in the context of online dating. In contrast, regarding the internalization of socio-cultural attitudes, Owens, Hughes and Owens-Nicholson (2003), have theorized that lesbians might find it easier to dismiss societal beauty norms as they have already broken one of society's most valued norms (heterosexuality). Thus, future studies are advised to closely examine the diverse effects on sexual and gender minorities, People of Color and of individuals of superior age. Furthermore, due to the cross-sectional study design, all findings are correlative, and causal interpretations of the associations cannot be put forward. Thus, future studies are also advised to focus on longitudinal studies which provide more insight on the direction of the relation between the different mechanisms, to improve causal claims.

Conclusion

This study supports that online dating applications have created an adverse environment which is negatively associated with mental well-being. The findings lend preliminary empirical support that self-objectification persists as a critical explanatory factor to understand the relationship between online dating use and mental well-being. The emphasis on appearance attributes encourages online dating users to embrace their objectification, even though it is associated with lower well-being. Insights on the underlying mechanisms can enhance our understanding of mental health risks, and has the potential to inform both online dating application providers on how to design applications which try to keep self-objectification as low as possible, as well as users on how to consciously use them. The current findings highlight the need for future research to examine to what extent the findings are apply to People of Color, to sexual and gender minorities, as well as for research examining additional underlying mechanisms playing a role in users' mental well-being.

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Appendix A

Informed consent

Dear participant,

You are being invited to participate in a research study about "Mental wellbeing in an era of online dating". This study is being done by a group of third-year Psychology students from the University of Twente from the Faculty of Behavioural, Management, and Social Sciences at the University of Twente. The purpose of this research is to investigate the relationship between online dating and different facets of mental wellbeing and will take approximately 20-30 minutes to complete. The data collected in this online survey will be treated strictly confidential. As such, all analysis of the collected data occurs anonymously and only for the purpose of this study. If the data is published, measures will be taken to ensure that no data of any individual is recognizable as such. Your participation in this study is entirely voluntary and you can withdraw at any time. There are no right or wrong answers to the questions. Try to go along with the first thoughts you have.

We believe there are no known risks associated with this research study. We will minimize any risks by safely storing the data and anonymize all of your answers. However, during the study you are asked to individually self-reflect upon different constructs of your current mental well-being level. If you have the feeling that your current level of mental well-being is at risk we kindly invite you (if you are a student of the University of Twente to contact the student psychologist (please contact the secretariat of SACC on office hours: +31 53 489 2035 or visit the desk in the Vrijhof, 3rd floor, room 311) or your study advisor) to get help by contacting self-help hotlines (<https://www.nhs.uk/conditions/stress-anxiety-depression/mental-health-helplines/>). Study contact details for further information were given.

Thank you for your participation.

In compliance with the EU General Data Protection Regulation GDPR for collection of new data active, informed consent is required.

I understand and consent that:

1. I am 18 years old or older.
2. The procedure will approximately take 20-30 minutes.
3. I understood the content and agreed to contribute my data for the use of this research.
4. I can withdraw from this research at any time by informing the researchers and all my data will be deleted.
5. My personal information will be anonymised to protect my privacy.
6. With my permission, I agree that all my data can be evaluated and used for the research.
7. I have been given the guarantee that this research project has been reviewed and approved by the BMS Ethics Committee. For research problems or any other questions regarding the research project, the Secretary of the Ethics Commission of the faculty Behavioural, Management and Social Sciences at the University of Twente may be contacted through ethicscommittee-bms@utwente.nl

In the case of questions or ambiguities, the researchers will be available in order to help.

Yes, I do consent.

No, I do not consent.

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Appendix B

Online survey

Please fill in the following questions on your demographics. What is your age? _____

What is your gender?

- Male
- Female
- Other, namely: _____
- Prefer not to answer

What is your nationality?

- Dutch
- German
- Other, namely: _____

Do you use online dating sites or mobile dating apps?

- Yes, I use it currently
- Yes, I used it in the past
- No, I never used it

Which site or app do/did you use?

- Tinder
- Lovoo
- Bumble
- Badoo
- Other, namely _____

How often do you make use of online dating apps/websites? How often have you made use of online dating apps/websites in the past?

- Once a month
- 2-3 times a month
- Once a week
- 2-3 times per week
- 4-5 times per week
- Daily

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Sociocultural Attitudes Towards Appearance Scale-4

Please mark the answer which best expresses your experience.

	Definitely disagree	Mostly disagree	Neither agree nor disagree	Mostly agree	Definitely agree
It is important to me to look athletic.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think a lot about looking muscular.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I want my body to look very thin.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I want my body to look like it has a little fat.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think a lot about looking thin.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I spend a lot of time doing things to look more athletic.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think a lot about looking athletic.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I want my body to look very lean.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think a lot about having very little body fat.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I spend a lot of time doing things to look more muscular.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel pressure from the media to look in better shape.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel pressure from the media to look thinner.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel pressure from the media to improve my appearance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel pressure from the media to decrease my level of body fat.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Appendix C

SPSS Output

Run MATRIX procedure:

***** PROCESS Procedure for SPSS Version 4.0 *****

Written by Andrew F. Hayes, Ph.D. www.afhayes.com
Documentation available in Hayes (2022). www.guilford.com/p/hayes3

Model : 4
Y : mhc
X : ODuse
M1 : SOBJ
M2 : SCA
M3 : BSAT

Sample
Size: 100

OUTCOME VARIABLE:

SOBJ

Model Summary

	R	R-sq	MSE	F	df1	df2
p	,2301	,0529	145,5569	5,4768	1,0000	98,0000
	,0213					

Model

	coeff	se	t	p	LLCI	ULCI
constant	-5,9259	1,6418	-3,6094	,0005	-9,1840	-2,6678
ODuse	5,6651	2,4207	2,3403	,0213	,8613	10,4689

OUTCOME VARIABLE:

SCA

Model Summary

	R	R-sq	MSE	F	df1	df2
p	,2038	,0415	82,3946	4,2459	1,0000	98,0000
	,0420					

Model

	coeff	se	t	p	LLCI	ULCI
constant	40,2037	1,2352	32,5472	,0000	37,7524	42,6550
ODuse	3,7528	1,8213	2,0606	,0420	,1386	7,3671

OUTCOME VARIABLE:

BSAT

Model Summary

	R	R-sq	MSE	F	df1	df2
p						

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,1347 ,0182 205,1258 1,8117 1,0000 98,0000
,1814

Model

	coeff	se	t	p	LLCI	ULCI
constant	41,2407	1,9490	21,1599	,0000	37,3730	45,1085
ODuse	3,8680	2,8737	1,3460	,1814	-1,8347	9,5706

OUTCOME VARIABLE:

mhc

Model Summary

	R	R-sq	MSE	F	df1	df2
p	,6612	,4372	95,7653	18,4516	4,0000	95,0000
	,0000					

Model

	coeff	se	t	p	LLCI	ULCI
constant	65,5043	5,1427	12,7373	,0000	55,2947	75,7139
ODuse	-6,5697	2,0506	-3,2037	,0018	-10,6408	-2,4987
SOBJ	-,2871	,0840	-3,4195	,0009	-,4538	-,1204
SCA	,2502	,1125	2,2245	,0285	,0269	,4734
BSAT	-,4141	,0721	-5,7397	,0000	-,5573	-,2709

***** DIRECT AND INDIRECT EFFECTS OF X ON Y *****

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI
-6,5697	2,0506	-3,2037	,0018	-10,6408	-2,4987

Indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
TOTAL	-2,2894	1,5381	-5,4066	,7050
SOBJ	-1,6265	,9202	-3,7800	-,1400
SCA	,9388	,5956	-,0689	2,2407
BSAT	-1,6017	1,2167	-4,0775	,7346

***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output:

95,0000

Number of bootstrap samples for percentile bootstrap confidence intervals:

5000

----- END MATRIX -----

Appendix D**Table 5***Overview results hypotheses*

Hypothesis	Independent Variable	Dependent Variable	Direction	Results
1.1	Online dating use	Mental health	Negative	Accepted
1.2	Online dating use	Self-objectification	Positive	Accepted
1.3	Online dating use	Socio-cultural attitudes	Positive	Accepted
1.4	Online dating use	Body dissatisfaction	Positive	Rejected
2.1	Self-objectification	Mental health	Negative	Accepted
2.2	Socio-cultural attitudes	Mental health	Negative	Rejected
2.3	Body dissatisfaction	Mental health	Negative	Accepted
3.1	Online dating use	Mental health	Mediated by self-objectification	Accepted
3.2	Online dating use	Mental health	Mediated by socio-cultural attitudes	Rejected
3.3	Online dating use	Mental health	Mediated by body dissatisfaction	Rejected
3.4	Online dating use	Mental health	Mediated by self-objectification socio-cultural attitudes and body satisfaction	Rejected

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Appendix E

SPSS Output

Bootstrap for Independent Samples Test

	Difference	Bootstrap ^a				
		Standard Error	95% Confidence Interval	Exact Sig. (2-tailed)	Exact Sig. (1-tailed)	Exact Sig. (1-tailed)
Equal variances assumed	5,66506	,03760	2,46205	,026	,86779	10,53448
Equal variances not assumed	5,66506	,03760	2,46205	,025	,86779	10,53448
Unequal variances assumed	3,75282	,05800	1,82798	,043	,25000	7,41297
Unequal variances not assumed	3,75282	,05800	1,82798	,042	,25000	7,41297
Unequal variances assumed	3,86795	,01395	2,85397	,176	-1,60443	9,45532
Unequal variances not assumed	3,86795	,01395	2,85397	,176	-1,60443	9,45532
Unequal variances assumed	-8,85910	,00096	2,39754	,000	-13,56310	-4,11625
Unequal variances not assumed	-8,85910	,00096	2,39754	,000	-13,56310	-4,11625

otherwise noted, bootstrap results are based on 5000 bootstrap samples

Bootstrap for Independent Samples Test

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		Mean Difference	Bias	Std. Error	Bootstrap ^a		
					Sig. (2-tailed)	95% Confidence Interval	
					Lower	Upper	
SOBJ	Equal variances assumed	5,66506	,03760	2,46205	,026	,86779	10,53448
	Equal variances not assumed	5,66506	,03760	2,46205	,025	,86779	10,53448
SCA	Equal variances assumed	3,75282	,05800	1,82798	,043	,25000	7,41297
	Equal variances not assumed	3,75282	,05800	1,82798	,042	,25000	7,41297
BSAT	Equal variances assumed	3,86795	,01395	2,85397	,176	-1,60443	9,45532
	Equal variances not assumed	3,86795	,01395	2,85397	,176	-1,60443	9,45532
mhc	Equal variances assumed	-8,85910	,00096	2,39754	,000	-13,56310	-4,11625
	Equal variances not assumed	-8,85910	,00096	2,39754	,000	-13,56310	-4,11625

a. Unless otherwise noted, bootstrap results are based on 5000 bootstrap samples