

Pleasures and Subjective Well-Being

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Abstract

In two daily diary studies we examined the moderating role of sensation seeking in the patterns of relations between physical pleasure and life satisfaction. In study 1 (a 52-day daily diary study), daily physical pleasure was a significantly stronger predictor of daily social satisfaction among high sensation seekers than among low sensation seekers. We extended the finding of study 1 to more general daily satisfaction in study 2 (a 23-day diary study). The present findings indicate that physical pleasure is associated with daily satisfaction to the degree that one seeks for such an experience. In addition, we tested whether the association between physical pleasure and daily satisfaction would be moderated also by other facets of extraversion and extraversion as a whole. With the exception of the positive emotion facet in study 1, no facet or extraversion as a whole moderated the relation between physical pleasure and daily satisfaction. The present studies show specificity and replicability of the role that sensation seeking plays in understanding the link between daily physical pleasure and daily satisfaction. Copyright © 2001 John Wiley & Sons, Ltd.

INTRODUCTION

Despite a plethora of research on personality, emotion, and well-being (see Diener, Suh, Lucas, and Smith, 1999; DeNeve and Cooper, 1998; Larsen and Diener, 1992; Rusting, 1998, for reviews), individual differences in the types of specific experience that are indicative of well-being are still largely unknown. In particular, physical pleasures have not received much research attention in the context of subjective well-being (SWB), despite the fact that (i) such experiences have long been recognized as one of the fundamental types of pleasure (Cason, 1932; Freud, 1920; Rozin, 1999; Young, 1961) and (ii) visceral pleasures are a prominent everyday concern for many people. How much satisfaction do people gain from physical pleasures? How and to what extent do individuals differ in the degree of satisfaction they gain from physical pleasures? These

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questions are central for understanding the types of experience that are a precursor to a sense of well-being in everyday lives.

Physical pleasures

Pleasures and pains have been of great interest to philosophers and psychologists for centuries. Indeed, many psychological theories centered around pleasure and displeasure, from Freud's (1920) pleasure principle, to Thorndike's (1911) learning theory, to Osgood's (Osgood, Suci and Tannenbaum, 1957) evaluation theory. Because the term pleasure captures a wide variety of pleasant experiences and has been used in diverse contexts, it is instructive to distinguish different types of pleasure. There are three types of pleasure that have received research attention in psychology: (i) sensory pleasures such as sexual and culinary pleasures that are physically localizable, (ii) aesthetic pleasures such as pleasures from music that are more abstract, and (iii) accomplishment pleasures that are caused by achieving something of personal value (Rozin, 1999). In addition, it is instructive to distinguish different temporal frames of pleasure. There are three time frames of pleasures: (a) anticipated pleasure, (b) on-line, or present pleasure, and (c) remembered pleasure (Rozin, 1999).

According to Rozin's (1999) classification, accomplishment pleasure in the form of the anticipation and memory of success has been by far most intensely investigated by well-being researchers (e.g. Brunstein, 1993; Cantor, Norem, Langston, Zirkle, Fleeson and Cook-Flannagan, 1991; Emmons, 1986, 1991; Little, 1983; McGregor and Little, 1998; Oishi, Diener, Suh and Lucas, 1999). In fact, goal expectancy and attainment are foci of many theories in SWB (Diener, 1984; Emmons, 1986; Little, 1983). In addition, motivational aspects of goal pursuit, such as the effortful pursuit of important goals and self-regulation, are deemed as keys to optimal psychological functioning (Cantor and Blanton, 1996; Mischel, Cantor and Feldman, 1996). To the extent that human beings are goal oriented (Lewin, 1951; Tolman, 1932) and self-improvement is a fundamental human need (Rogers, 1961), accomplishment pleasures are crucial in understanding SWB, and thus the dominance of accomplishment pleasure as the subject of research in SWB is understandable.

In sharp contrast to the active research on accomplishment pleasures, sensory pleasures have been largely neglected in SWB research. Indeed, none of the major theories in SWB takes into serious consideration the role of sensory pleasure. The lack of research on the role of sensory pleasure in SWB may be due to the following assumptions. First, there is the perception that physical pleasures are ephemeral and therefore do not have significant implications for long-term well-being. Second, only a small number of people list sensory pleasures as their important personal strivings (Emmons, 1996), and therefore they may not warrant full research attention. Third, there is an assumption that excessive engagement in physical pleasures may prevent individuals from being productive in society, and therefore physical pleasures should not constitute a characteristic of well-functioning individuals (Jahoda, 1958).

Although these assumptions are sensible, they cannot altogether justify the lack of the empirical investigation of the role of physical pleasures in SWB. First, the degree of association between day-to-day physical pleasures and global life satisfaction has not been empirically shown. Given that sensory pleasures exist not just as on-line experiences but also as remembered pleasures, the first assumption that sensory pleasure may not have an impact on long-term well-being requires an empirical test. Moreover, even if physical

pleasures do not have an impact on long-term well-being (e.g. satisfaction with life as a whole), they may still have an influence on short-term well-being (e.g. satisfaction with the day). Second, physical pleasures capture the satisfaction of basic biological needs such as hunger and sex (Maslow, 1970). Because biological needs are relatively easily satisfied in modern society, people often list the satisfaction of higher-order needs such as intimacy and esteem needs as conscious goals (Emmons, 1996). Nevertheless, the relative dominance of intimacy and esteem goals does not negate the fact that many people do seek and enjoy physical pleasures. Indeed, the cover stories of popular magazines often concern gourmet food, wine, and sex. To the extent that the satisfaction of these needs is indispensable in human lives, the role of physical pleasures in SWB should not be ignored. Finally, there are important individual differences in the strength and frequency of the need for physical pleasure (see e.g. Zuckerman, 1979, 1990, 1994), and such individual differences may have important implications for individual differences in the predictors of SWB.

Individual difference in physical pleasures

Individual difference in the need for physical pleasure may be best captured by sensation seeking, which is defined as 'the need for varied, novel, and complex sensations and experiences and the willingness to take physical and social risks for the sake of such experiences' (Zuckerman, 1979, p. 10). Sensation seekers desire and experience high arousal activities such as reckless driving (Arnett, 1996; Heino, van der Molen and Wilde, 1996), physical fighting (Mustonen, Arms and Russell, 1996), substance abuse (Gordon and Galtabiano, 1996), and experimental sexual behaviors (Zuckerman, Tushup and Finner, 1976; see Zuckerman, 1990, 1994, for a review). Research on sensation seeking has accumulated robust evidence for a strong link between sensation seeking and the preference for high arousal, physical pleasure.

Although there is evidence that individuals differ in the types of emotional experiences they seek and desire (see e.g. Rusting and Larsen, 1995), previous research has not directly tested whether physical pleasures will in fact result in a stronger sense of satisfaction among people who seek such pleasures to a greater extent than those who do not. In considering the moderating role of needs and desires in SWB, research on accomplishment pleasures is illuminating. Oishi *et al.* (1999), for example, examined the connection between domain satisfaction and global life satisfaction, and found that satisfaction with the value-congruent domain was a significantly stronger predictor of global life satisfaction than satisfaction with the value-incongruent domain. That is, achievement of the day was a strong predictor of daily satisfaction for achievement-oriented individuals, whereas social interaction of the day was a strong predictor for relationship-oriented individuals. In addition, a number of daily diary studies provide a converging picture on the connection between daily events and emotional reactions. Specifically, goal-congruent life events generated a stronger emotional reaction than goal-incongruent life events (Cantor *et al.*, 1991; Emmons, 1991). The degree to which interpersonal conflicts induced negative emotions was significantly stronger for people high in agreeableness than those low in agreeableness (Suls, Martin and David, 1998). Similarly, the degree to which participants experienced positive emotions while engaging in an agreeable behaviour was significantly stronger among people with high agreeableness and extraversion than among those low in agreeableness and extraversion (Cote and Moscovitz, 1998). These studies indicate that the degree to which specific domains and life events are associated with

global life satisfaction and positive affect may not be uniform across individuals, but systematically varies across individuals, depending on personality, goals, and values.

The present studies

Building on the previous process-oriented research on personality, emotion, and life satisfaction (e.g. Cantor *et al.*, 1991; Cote and Moscovitz, 1998; Emmons, 1991; Oishi *et al.*, 1999; Suls *et al.*, 1998), we decided to investigate the role of physical pleasure in SWB for two reasons. First, as stated earlier physical pleasures are important and prominent concerns for many people in their daily lives. Yet the function of physical pleasures in SWB has not received sufficient research attention in the past. Second, there is a well documented individual difference in the degree to which people desire physical pleasure. The extensive research on sensation seeking provides a solid starting point for our investigation. The previous studies (e.g. Zuckerman *et al.*, 1976) indicate that sensation seekers desire physical pleasures to a greater extent than non-sensation seekers. Thus, we tested whether the links between physical pleasure and daily satisfaction would be stronger among high sensation seekers than among low sensation seekers. The first goal of our investigation was to delineate a moderating role of sensation seeking in the link between daily physical pleasures and daily satisfaction. Second, we aimed to explore the degree to which daily physical pleasures are related to long-term as well as short-term well-being. Finally, we tested the specificity of the moderating role of sensation seeking by examining whether other facets of extraversion (e.g. gregariousness, assertiveness, and warmth) and extraversion as a whole would also moderate the relation between physical pleasure and daily satisfaction.

STUDY 1: A 52-DAY DAILY DIARY STUDY

The data used in study 1 were collected before the present project was initiated. This data set included a proximal daily satisfaction variable, or daily social life satisfaction. In addition, the fact that the data contained the assessment of daily physical pleasure (i.e. 'how frequently did you experience physical pleasure such as sex and food today?') and sensation seeking allowed us to examine our hypothesis: the degree to which daily physical pleasure is associated with daily social life satisfaction should be stronger among people high in sensation seeking than among those low in sensation seeking.

Method

Participants

Participants were 152 (79 men and 73 women) undergraduate students at the University of Illinois who enrolled in a course in personality and well-being.

Measures

We measured sensation seeking by a facet of the extraversion scale in the NEO Personality Inventory (NEO-PI) (Costa and McCrae, 1989). The NEO-PI extraversion scale consists of six facets: warmth, gregariousness, assertiveness, activity, excitement seeking, and positive emotions. The excitement seeking facet consists of eight items assessing the

degree to which individuals crave excitement and want to be part of the 'action'. Participants responded to the statements on a five-point scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), with a midpoint value of 3 (*neutral*). The internal consistency, or Cronbach's alpha, for the excitement seeking facet was 0.69 in this sample ($M = 21.52$, $SD = 4.53$).

We measured daily pleasure by asking respondents 'how frequently did you experience physical pleasure such as sex and food today?' each day on a seven-point scale, ranging from 1 (*never*) to 7 (*always*) with a midpoint value of 4 (*about half of the time*). The grand mean of daily physical pleasure was 2.32 ($SD = 1.29$). We also measured daily social life satisfaction by asking participants to indicate how satisfied they were with their social lives that day on a ten-point scale, ranging from 1 (*not at all*) to 10 (*extremely*). The grand mean of daily social life satisfaction was 6.54 ($SD = 1.57$). We did not ask a question about overall daily satisfaction in study 1. In addition, we measured long-term life satisfaction by the Satisfaction With Life Scale (SWLS; Diener, Emmons, Larsen and Griffin, 1985). The SWLS consists of five items such as 'I am satisfied with my life' ($M = 25.40$; $SD = 5.87$).

Procedure

Participants completed the NEO-PI in the laboratory sessions before the inception of the daily diary study. Participants were instructed to complete the daily report in the evening before they went to bed, and to turn in each report the following day (excluding weekends). Reports concerning Fridays, Saturdays, and Sundays were turned in on Mondays. The participants completed the SWLS after the daily diary study.

Results and discussion

To test our hypothesis, we adopted a hierarchical linear model (HLM) approach (Bryk and Raudenbush, 1992), using the HLM/2L program. The HLM program was developed to test the multi-level interaction. The multi-level interaction under investigation in this study was the interaction between an intra-individual level variable, physical pleasure, and an inter-individual level variable, sensation seeking. We were interested in how intra-individual relations between daily experiences of physical pleasure and daily social life satisfaction might vary across individuals, depending on the inter-individual level variable of sensation seeking.

HLM conceptually involves two steps. First, a regression analysis is performed at the intra-individual level. In this study, daily social life satisfaction was predicted from daily physical pleasure for each individual. To increase the interpretability of the intercept, we centred all predictor variables around the grand mean across all participants (CGM; Kreft, de Leeuw and Aiken, 1995). Therefore, the within-person model was as follows:

$$SLS_t = b_0 + b_1P_t + e_t$$

where SLS_t is social life satisfaction on day t ; P_t is physical pleasure on day t ; b_0 is the intercept (i.e. daily social life satisfaction when participants had an average level of physical pleasure on that day); b_1 is the slope for day t physical pleasure (i.e., the degree to which day t physical pleasure was associated with day t social life satisfaction); and e_t is a random component of day t social life satisfaction.

The second, inter-individual level of the model tests whether the regression slopes obtained from the level 1 analysis would be different across individuals, depending on the level of sensation seeking. Particularly relevant to our hypothesis is whether b_1 , or the slope for day t physical pleasure predicting day t social life satisfaction, would differ across individuals as a function of sensation seeking. Again, to increase interpretability of the results, we centred sensation seeking around the grand mean across all participants. Therefore, the inter-individual level model was as follows:

$$b_0 = \gamma_{00} + \gamma_{01}SS_i + u_i$$

$$b_1 = \gamma_{10} + \gamma_{11}SS_i + u_i$$

where γ_{00} and γ_{10} are intercepts; γ_{01} and γ_{11} indicate the degree to which level 1 intercept b_0 and slope b_1 were associated with sensation seeking; and u_i is a random component of slope b_0 and b_1 .

Hypothesis testing

HLM analysis revealed that on the average physical pleasure was positively associated with social life satisfaction (unstandardized coefficient, $b_1 = 0.376$, $t[150] = 13.88$, $p = 0.00$). As predicted, however, the size of association between physical pleasure and daily social life satisfaction varied across individuals, depending on the level of sensation seeking (unstandardized coefficient $\gamma_{11} = 0.012$, $t[150] = 2.08$, $p = 0.04$). More specifically, this means that b_1 for a low sensation seeker (1 SD below mean = SS score of 16.99) would be 0.32 (i.e. one unit increase in physical pleasure is associated with 0.32 increase in social life satisfaction), whereas b_1 for a high sensation seeker (1 SD above mean = SS score of 26.05) would be 0.43 (i.e. one unit increase in physical pleasure is associated with 0.43 increase in social life satisfaction). As can be seen in Figure 1, on a day when a low sensation seeker and a high sensation seeker did not have much physical pleasure (physical pleasure = 1), a low sensation seeker would evaluate social life satisfaction more positively than a high sensation seeker (low sensation seeker, 6.24, versus high sensation seeker, 6.02; difference = -0.22). However, on a day when they had a lot of physical pleasure (physical pleasure = 7), a high sensation seeker would evaluate social life satisfaction more positively than a low sensation seeker (high sensation seeker, 8.59, versus low sensation seeker, 8.17; difference = $+0.42$). Thus, social life satisfaction of a

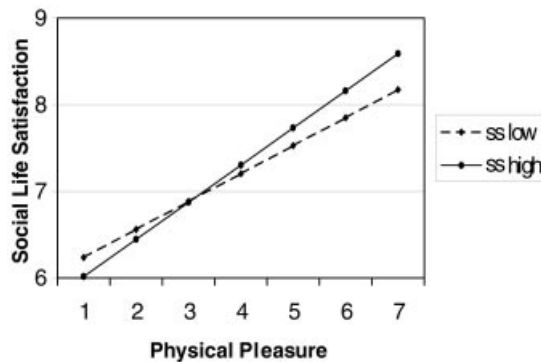


Figure 1. Low and high sensation seekers evaluation of social life satisfaction.

high sensation seeker is more dependent on physical pleasure than that of a low sensation seeker.

Is the interaction specific to sensation seeking?

Although we found the predicted multi-level interaction between sensation seeking and physical pleasure in the above analysis, there is a question regarding specificity of this interaction. That is, is this interaction specific to sensation seeking? To the extent that extraversion is often described as predisposition to experiencing positive emotion, including excitement (e.g. Watson and Clark, 1997), would we obtain the same result if we used other facets of extraversion or extraversion as a whole? In order to examine this question, we tested the models including each facet of extraversion and all six facets of extraversion combined as a predictor at the inter-individual level variable. For instance, we tested whether the degree of association between physical pleasure and social life satisfaction would be moderated by one's levels of warmth, as described below.

$$b_0 = \gamma_{00} + \gamma_{01} \text{ warmth} + u_i$$

$$b_1 = \gamma_{10} + \gamma_{11} \text{ warmth} + u_i$$

We entered warmth, gregariousness, assertiveness, activity, positive emotion, and extraversion as a whole, respectively, as a sole predictor at the inter-individual level, and tested each model. As can be seen in Table 1, warmth, gregariousness, assertiveness, activity, and extraversion as a whole did not moderate the relation between physical pleasure and social life satisfaction. Besides the sensation seeking facet, only the positive emotion facet moderated the relation between physical pleasure and social life satisfaction.

Table 1. Interaction effects of sensation seeking and other extraversion facets on the link between daily physical pleasure and daily satisfaction in studies 1 and 2

	Unstandardized coefficient (γ_{11})	<i>t</i> -value	<i>p</i> -value
<i>Study 1</i>			
Sensation seeking	0.012	2.08	0.04
Warmth	0.005	0.79	0.49
Gregariousness	0.003	0.48	0.63
Assertiveness	-0.004	-0.71	0.48
Activity	-0.003	-0.41	0.68
Positive emotion	0.012	1.90	0.06
Extraversion as a whole	0.001	0.89	0.38
<i>Study 2</i>			
Sensation seeking	0.008	1.79	0.07
Warmth	0.003	0.65	0.52
Gregariousness	0.004	1.09	0.28
Assertiveness	0.001	0.41	0.68
Activity	-0.002	-0.49	0.62
Positive emotion	-0.000	-0.01	0.99
Extraversion as a whole	0.001	0.74	0.46

γ_{11} was obtained from each HLM analysis, in which b_1 was predicted only from each of the six extraversion facets and extraversion as a whole at the inter-individual level.

In addition, we examined whether the moderating role of sensation seeking would hold when controlling for sex. Thus, in the next analysis we included sex (female = 0, male = 1) in the inter-individual level model, while the within-individual level model was the same as the above analyses.

$$b_1 = \gamma_{10} + \gamma_{11}SS_i + \gamma_{12}sex_i + u_i$$

In this model, the intercept, b_0 , was also predicted from both sensation seeking and sex. This analysis revealed that the link between physical pleasure and social life satisfaction was moderated by one's levels of sensation seeking, above and beyond the effect of sex (unstandardized coefficient $\gamma_{11} = 0.014$, $t[149] = 2.40$, $p = 0.02$). On the other hand, there was no significant sex difference in the degree to which physical pleasure was associated with social life satisfaction (unstandardized coefficient $\gamma_{12} = -0.086$, $t[149] = -1.56$, $p = 0.12$), above and beyond sensation seeking. It should be also mentioned that there was no sex difference when sex was the only predictor at the inter-individual level model (unstandardized coefficient = -0.064 , $t[149] = -1.172$, $p = 0.24$).

Consistent with our hypothesis, therefore, the results from study 1 show that the degree to which daily physical pleasure was associated with daily social life satisfaction was significantly different across individuals, depending on the level of sensation seeking. Specifically, daily physical pleasure had a stronger impact on daily social life satisfaction among high sensation seekers than among low sensation seekers. The moderating role of sensation seeking was not replicated using other facets of extraversion and extraversion as a whole, with the exception of the positive emotion facet. Furthermore, the moderating role of sensation seeking was obtained when sex of the participants was taken into account. That is, the interaction between sensation seeking and physical pleasure remained significant, controlling for the effect of sex on the link between physical pleasure and social life satisfaction.

Physical pleasures and long-term well-being

Next, we examined whether physical pleasures would be related to long-term global life satisfaction. Although the average within-person correlation between daily physical pleasure and daily social life satisfaction was significantly different from zero ($r = 0.27$, one sample $t[151] = 15.37$, $p < 0.01$), the average physical pleasure during the 52-day diary study was not significantly associated with long-term global life satisfaction ($r[146] = 0.12$, ns). On the other hand, the average daily social life satisfaction was significantly associated with global life satisfaction ($r[146] = 0.58$, $p < 0.01$). Also, the degree of association between the average daily physical pleasure and global life satisfaction was significantly weaker than the degree of association between the average daily social life satisfaction and global life satisfaction, as can be seen by the non-overlapping 95% confidence intervals for these two coefficients in Table 2.

We also conducted a regression analysis to examine whether the association between the average daily physical pleasure and global life satisfaction would be stronger among sensation seekers. Contrary to the finding on daily satisfaction, the interaction was non-significant ($B = 0.43$, $\beta = 0.07$, $t[142] = 0.84$, ns). Thus, although the role of physical pleasure in daily social satisfaction was significantly stronger among sensation seekers than non-sensation seekers, there was no such moderating effect of sensation seeking in the role of the average daily physical pleasures in long-term well-being.

Table 2. Correlation coefficients (95% confidence intervals) among average daily physical pleasure (DP), average daily satisfaction (DS), general life satisfaction (GS), and sensation seeking (SS) in studies 1 (upper half) and 2 (lower half)

	DP	DS	GS	SS
Daily physical pleasure (DP)		0.14 ⁺ (0.03↔0.30)	0.12 (-0.05↔0.28)	0.11 (-0.06↔0.27)
Daily satisfaction (DS)	0.42** (0.28↔0.55)		0.58** (0.46↔0.68)	0.02 (-0.15↔0.18)
General life satisfaction (GS)	0.28** (0.12↔0.43)	0.46** (0.32↔0.58)		0.03 (-0.14↔0.20)
Sensation seeking (SS)	0.25** (0.09↔0.39)	0.07 (-0.09↔0.23)	0.00 (-0.16↔0.16)	

⁺ $p < 0.10$; * $p < 0.05$; ** $p < 0.01$.

Physical pleasure is the mean daily physical pleasure. Daily satisfaction is the mean daily social life satisfaction in study 1 and the mean daily satisfaction in study 2. General life satisfaction is assessed by the Satisfaction with Life Scale.

STUDY 2: A 23-DAY DAILY DIARY STUDY

Study 1 yielded an encouraging result: the informational value of physical pleasure in daily social life satisfaction judgments differs across individuals, depending on the degree of sensation seeking. This moderation effect could be, however, peculiar to the domain of social life, given that 'excitement' is often an integral ingredient of social life. A major weakness of study 1 was that it did not assess more general, daily satisfaction. It is unclear from study 1, therefore, whether sensation seeking moderates the link between physical pleasure and more general satisfaction judgments. Study 2 was conducted to address this issue. As in study 1, we predicted that the degree of physical pleasure would be a stronger predictor of daily satisfaction among high sensation seekers than among low sensation seekers. In addition, we sought to examine again the link between the average daily physical pleasure and long-term global life satisfaction.

Method

Participants

Participants were 141 University of Illinois students (41 male, 100 female) who enrolled in an advanced psychology course on personality and well-being.

Measures

As in study 1, we measured sensation seeking by the NEO-PI (Costa and McCrae, 1989). The mean sensation seeking score for this sample was 20.05 (SD = 4.40, Cronbach alpha = 0.67). We measured daily satisfaction by asking participants to indicate at the end of each day how good or bad that day was, using a nine-point scale, ranging from 1 (*extremely bad*) to 9 (*extremely good*) with a midpoint value of 5 (*neither good nor bad*). The grand mean of daily satisfaction was 6.07 (SD = 1.76). We measured daily physical pleasure by asking them to rate how much physical pleasure (e.g. sex, food, exercise) they had experienced that day on a nine-point scale, ranging from 1 (*not at all*) to 9 (*extremely a lot*) with a midpoint value of 5 (*moderately*). The grand mean of daily physical pleasure

was 4.07 (SD = 2.39). Again, we measured long-term life satisfaction by the SWLS ($M = 23.41$, $SD = 6.00$).

Procedure

One week before the inception of the daily diary study, all participants completed the NEO-PI (Costa and McCrae, 1989). Participants completed the daily reports at the end of each day, and submitted them the following morning with the exception of weekends. Daily reports concerning Fridays, Saturdays, and Sundays were turned in on Mondays. The participants completed the SWLS after the daily diary study. Three participants were removed from all analyses because (a) their daily physical pleasure ratings and/or daily satisfaction had very little variation day to day (i.e., standard deviation less than 1.00) and (b) the within-person correlation between physical pleasure and daily satisfaction was more than two standard deviations below the mean.

Results and discussion

As in study 1, we tested our hypothesis using HLM (Bryk and Raudenbush, 1992). Day t satisfaction was predicted from day t physical pleasure at the within-individual level. The level 1 intercepts and slopes were then regressed on sensation seeking at the inter-individual level. As in study 1, all the variables entered in the model were centred around the grand means across all participants.

Hypothesis testing

Consistent with study 1, on average, daily physical pleasure was significantly associated with daily satisfaction ($b_1 = 0.36$, $t[136] = 19.87$, $p < 0.01$). Replicating study 1, the degree of association between physical pleasure and daily satisfaction marginally significantly varied across individuals, depending on the levels of sensation seeking ($\gamma_{11} = 0.01$, $t[136] = 1.79$, $p = 0.07$). More specifically, b_1 for a low sensation seeker (1 SD below mean = SS score of 15.65) would be 0.32 (i.e. one unit increase in physical pleasure is associated with 0.32 increase in daily satisfaction), whereas b_1 for a high sensation seeker (1 SD above mean = SS score of 24.45) would be 0.39 (i.e. one unit increase in physical pleasure is associated with 0.39 increase in daily satisfaction). This further means that on a day when a low sensation seeker and a high sensation seeker did not have much physical pleasure (physical pleasure = 1), a low sensation seeker would evaluate daily satisfaction more positively than a high sensation seeker (i.e. low sensation seeker, 5.20, versus high sensation seeker, 4.81; difference = -0.39). However, on a day when they had a lot of physical pleasure (physical pleasure = 9), a high sensation seeker would evaluate daily satisfaction more positively than a low sensation seeker (i.e. high sensation seeker, 7.91, versus low sensation seeker, 7.74; difference = $+0.17$). Thus, daily satisfaction of a high sensation seeker is more dependent on physical pleasure than that of a low sensation seeker.

Is the interaction specific to sensation seeking?

As in study 1, we examined whether the moderating role of sensation seeking would be specific to sensation seeking by conducting six additional analyses that tested the models with each of the five other facets of extraversion and extraversion as a whole at the inter-individual level. Consistent with study 1, the degree of association between physical

pleasure and daily satisfaction did not vary, depending on warmth, gregariousness, assertiveness, activity, and extraversion as a whole (see Table 1). Unlike study 1, there was no significant interaction between the positive emotion facet of extraversion and physical pleasure in predicting daily satisfaction (see Table 1). Indeed, the link between physical pleasure and daily satisfaction was moderated only by sensation seeking, not by the other five facets of extraversion or extraversion as a whole, demonstrating the specificity of this multi-level interaction.

Next, we tested whether the moderating role of sensation seeking would hold when the effect of sex on the link between physical pleasure and daily satisfaction was taken into account. More specifically, we tested the model that included sex (female = 0, male = 1) as well as sensation seeking as predictors of both b_0 and b_1 at the inter-individual level. Again, consistent with study 1, the moderating role of sensation seeking remained marginally significant, above and beyond sex (unstandardized coefficient $\gamma_{11} = 0.01$, $t[135] = 1.75$, $p = 0.08$). On the other hand, there was no significant sex difference in the degree to which physical pleasure was associated with daily satisfaction (unstandardized coefficient $\gamma_{12} = -0.01$, $t[135] = -0.20$, ns), above and beyond sensation seeking. It should be also mentioned that there was no sex difference when sex was the only predictor at the inter-individual level model (unstandardized coefficient = 0.01, $t[135] = 0.31$, ns).

Physical pleasures and long-term well-being

Next, we examined whether physical pleasures would be related to long-term global life satisfaction. The average within-person correlation between daily physical pleasure and daily social life satisfaction was significantly different from zero ($r = 0.43$, one sample $t[137] = 21.46$, $p < 0.01$). Unlike study 1, the average physical pleasure during the 23-day diary study was significantly associated with long-term global life satisfaction ($r[138] = 0.28$, $p < 0.01$). Consistent with study 1, however, the degree of association between the average daily physical pleasure and global life satisfaction was significantly weaker than the degree of association between the average daily satisfaction and global life satisfaction ($r[138] = 0.46$, $p < 0.01$), as can be seen in the non-overlapping 95% confidence intervals (see Table 2).

We also conducted a regression analysis to examine whether the association between the average daily physical pleasure and global life satisfaction would be stronger among sensation seekers. Contrary to the finding on daily satisfaction, the interaction was non-significant ($B = -0.22$, $\beta = -0.04$, $t[134] = 0.42$, ns). Thus, although the role of physical pleasure in daily satisfaction was significantly stronger among sensation seekers than non-sensation seekers, there was not such moderating effect of sensation seeking in the role of the average daily physical pleasures in long-term well-being.

GENERAL DISCUSSION

We began the present investigation with the following questions in mind: 'What is satisfying experience?' and 'How much do people differ on satisfying experiences?'. As a first step toward answering these questions, we examined whether the function of physical pleasures in satisfaction judgments varies across individuals, depending on the level of sensation seeking. Consistent with our hypothesis, two daily diary studies revealed that the

degree to which daily physical pleasure was associated with daily satisfaction differed across individuals, depending on the level of sensation seeking. Physical pleasure was a stronger indicator of daily satisfaction among high sensation seekers than among low sensation seekers (see Figure 1). Building on the previous findings (e.g. Cantor *et al.*, 1991; Cote and Moskowitz, 1998; Emmons, 1991), these findings illuminate within-individual variations in day-to-day well-being and how such within-individual processes differ across individuals, depending on the level of sensation seeking. More generally, the present findings pose the possibility that different types of pleasure lead to a sense of satisfaction across individuals, depending on what people seek and desire.

Short-term versus long-term well-being: are they the same?

One of the most intriguing findings in the present research was the different patterns of correlations among physical pleasures, daily satisfaction, and long-term global life satisfaction. Whereas daily physical pleasures were strongly associated with daily satisfaction in both studies, the average daily physical pleasures were not associated with long-term global life satisfaction in study 1. Also, the degree to which the average daily physical pleasure was associated with long-term global life satisfaction was significantly weaker than the degree to which the average daily satisfaction was associated with long-term global life satisfaction in both studies. Furthermore, the moderating role of sensation seeking was not significant in long-term well-being in either study. The divergent findings on the short-term and long-term well-being elucidate the very nature of the function of physical pleasures in SWB. Physical pleasure provides immediate satisfaction. Furthermore, to the extent that sensation seekers desire the immediate gratification of physical needs, physical pleasures are more important for the short-term well-being of sensation seekers than for non-sensation seekers. However, this sense of satisfaction does not last for long because the need for physical pleasures reappears soon after the experience of physical pleasure. In addition, the memory of past physical pleasure may induce not only positive feelings, but also a craving for new physical experiences, and therefore may result in a sense of dissatisfaction rather than satisfaction. Furthermore, the lack of the moderating effect of sensation seeking on the link between physical pleasure and long-term well-being indicates that even among sensation seekers the amount of past physical pleasure does not matter in judging satisfaction with life as a whole. Similar to the findings of Suh, Diener and Fujita (1996) on life events, therefore, only recent physical pleasures seem to matter in a general sense of satisfaction. The different patterns of correlations in daily satisfaction and global life satisfaction suggest that the predictors of SWB may differ, depending on the time frame of the well-being under investigation. That is, the predictors of daily satisfaction may not always be the same as monthly or general life satisfaction.

These differences have an important implication for the assessment of SWB. Recently, Kahneman (1999) proposed that, because global self-reports of SWB are vulnerable to various judgment biases, SWB be measured by the aggregate of on-line hedonic valence. Although the discrepancy between the aggregate of on-line measures (e.g. the experience sampling method) and global self-reports of SWB may be due to artifacts such as recency effect, the discrepancy may be derived from the fundamental difference in the *bases* of short-term and long-term life satisfaction judgments. The present findings, for instance, suggest that the aggregate of daily satisfaction reflects a good deal of daily physical pleasures, whereas self-reports of global life satisfaction do not reflect the amount of daily

physical pleasures to a similar degree. This further suggests that the aggregate of momentary moods is likely to tap visceral experiences (e.g. hunger), which may not be very relevant to global life satisfaction judgments.

The current findings have another important implication for one of the most counter-intuitive findings in the well-being research so far: the lack of correlation between money and well-being (see Diener *et al.*, 1999, for a review). In previous research on income and well-being, well-being was measured only by global life satisfaction (see e.g. Veenhoven, 1991). The result was typically interpreted as 'money doesn't buy happiness'. Our findings, however, suggest a more complex picture on the relations between money and happiness. That is, it is possible that although people do not evaluate their global life satisfaction based on their income or material possessions, they do indeed enjoy their new cars and boats on a day-to-day basis. Whereas the extant research aimed to identify factors determining global life satisfaction, the future research should also aim to identify the factors determining short-term life satisfaction.

Conclusion

Physical pleasures are important indicators of daily satisfaction, particularly among sensation seekers. Equally important, however, physical pleasures do not have a long lasting influence on a general sense of well-being. What determines moment-to-moment well-being? What predicts global self-reports of well-being? Are the variables important in short-term well-being also important in a general sense of satisfaction? The explication of convergence and divergence in correlates of short-term and long-term well-being should clarify important assessment issues in SWB research, and deepen our understanding of the nature of SWB in the future.

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