

How the Type of Activity and the Inclusion of Social Interaction Affect Customers' Health Behavior Intentions and Attitudes to Pay-As-You-Live Plans

Franziska Unger

Abstract

Health insurance providers aim to reduce costs by encouraging healthy behaviors among their customers. One method they employ in this context is the use of reward programs such as pay-as-you-live (PAYL) plans, which require customers to record health-related information and incentivize healthy lifestyles by offering cash rewards, discounts on insurance premiums, and/or other benefits. We conducted an experimental study investigating the impact, within PAYL plans, of type of activity rewarded (high-frequency vs. low-frequency) and elements of social interaction (present vs. absent) on consumers' health behavior intentions. Our findings show that consumers' self-reported health behavior intentions are stronger when a PAYL plan incentivizes high-frequency activities than when low-frequency activities are the subject of rewards. We further find that elements of social interaction within a PAYL plan moderate the influence of activity type on consumers' attitudes to these policies. Where rewards are offered for high-frequency activities such as exercise, consumers' attitudes to PAYL plans are more positive when elements of social interaction are absent from the plan than when they are present. The more positive the attitudes consumers show toward PAYL plans, the stronger the health behavior intentions they express.

Zusammenfassung

Krankenversicherungsanbieter versuchen zunehmend, die Konsumenten zu einem gesunden Lebensstil zu motivieren, indem sie Belohnungsmechanismen in ihre Preisgestaltung und Services aufnehmen. Folglich entwickelten sich sogenannte Pay-as-you-live (PAYL) Tarife in der Krankenversicherung, welche das Potenzial haben, die langfristigen Kosten für die Versicherten zu senken, indem sie eine gesündere Lebensweise der Konsu-

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menten fördern. PAYL Tarife belohnen gesundheitsfördernde Verhaltensweisen (z.B. Krebsvorsorge, körperliche Aktivität) der Verbraucher mit einem Rabatt auf die Versicherungsprämie oder mit Geld- oder Sachprämien. Die optimale Ausgestaltung derartiger Tarife wurde bisher aufgrund der Neuartigkeit wenig erforscht. Die Ergebnisse einer experimentellen Studie zeigen, dass Konsumenten eine höhere gesundheitsförderliche Verhaltensintention angeben, wenn Aktivitäten mit hoher Regelmäßigkeit (z.B. körperliche Aktivität) belohnt werden im Vergleich zu Aktivitäten mit geringer Regelmäßigkeit (z.B. Krebsvorsorge). Ferner ist die Einstellung der Verbraucher gegenüber PAYL Tarifen positiver, wenn bei Aktivitäten mit hoher Regelmäßigkeit keine sozialen Interaktionselemente eingesetzt werden, als wenn diese vorhanden sind. Je positiver die Einstellung der Konsumenten gegenüber einem PAYL Tarif, desto stärker ist die gesundheitsförderliche Verhaltensintention.

1. Introduction

Increasing numbers of health insurance providers are now rewarding health-promoting behaviors among their customers through pay-as-you-live (PAYL) plans, which incentivize health-conscious lifestyles via monetary or other benefits (Alami et al. 2020; Wulf and Betz 2021). Wulf and Betz (2021) define a program as genuinely PAYL when it entails the automatic (1), digital (2) and continuous (3) collection of health-related data with the aid of wearable technologies, from which ensues the incentivization of health-promoting behaviors (4) via various types of rewards (5). Incentives given within PAYL programs may include, for example, discounts on the customer's insurance premium, cash rewards, and non-cash rewards such as fitness equipment (Wulf and Betz 2021). As yet, few insurance providers offer genuine PAYL plans. The few examples currently on the market include PAYL life insurance plans offered by Generali Vitality (Germany) and John Hancock (U.S.). PAYL-based bonus programs which represent a form of PAYL plan, are more widespread. These differ from genuine PAYL plans in that, as well as involving the continuous collection of health-related data such as steps and pulse rate via wearable technologies, they require the recording of ad hoc health-related data, such as uptake of preventive medical checkups (Wulf and Betz 2021). Many German statutory health insurers offer PAYL-based bonus programs. One example, run by the major statutory insurer Techniker Krankenkasse (2023), rewards consumers for continuous health-related data gained from wearable technologies and for ad hoc health-related data. For our purposes, we will use the term "PAYL plans" to include schemes that record ad hoc health-related data, expanding the narrow definition given by Wulf and Betz (2021).

The behaviors rewarded within PAYL plans differ in terms of their temporal dimension, and particularly in terms of how often they take place (Scherenberg and Greiner 2008a). What we will term "low-frequency" activities may only be required a handful of times a year, or indeed less often; they include screening

tests for cancers, dental checkups, professional dental cleaning, vaccinations, and preventive medical checkups. “High-frequency” activities, by contrast, need to take place with frequent repetition during day-to-day life in order to be health-promoting; examples are physical exercise, walking (as measured by number of steps), and healthy eating.

Alongside rewarding various different types of activity, health insurance providers may employ elements of social interaction, such as communities and leaderboards, within their PAYL plans to help motivate consumers to engage in health-promoting behaviors. Elements of social interaction are a type of motivational design mechanism that involve social incentives and can support consumers' intrinsic motivation (Chen and Pu 2014; Hamari and Koivisto 2015; Deci et al. 1999). Health apps and wearable technologies such as fitness trackers and smartwatches use these incentives similarly for motivational purposes. The use of social interaction, which has increased overall in recent times, invokes the social influence of an individual's peers in order to steer their health-related behaviors (Hamari and Koivisto 2015). Besides using the health-related data gained from wearable technologies and applications for self-optimization and sharing them with family and friends, increasing numbers of consumers are now voluntarily passing their health-related data to third parties such as health insurance providers (Wulf and Betz 2021). Initial publications in this area point to potential benefits from research investigating the use of social interaction mechanisms to reward various types of activity (Zhu et al. 2017).

PAYL plans are currently an under-researched area in insurance, despite the numerous potential benefits they offer to insurers (such as increased customer satisfaction and loyalty, accuracy in risk assessment, and cost savings), consumers (such as the ability to receive rewards), and society as a whole (such as the promotion of preventive action on health issues of global importance). Various scholars recommend the investigation of optimum design principles for PAYL health insurance plans for maximum persuasiveness with consumers (Eling and Kraft 2020; Sihler and Voeth 2019; Unger and Steul-Fischer 2023; Wiegard et al. 2019; Wiegard and Breitner 2019; Wulf and Betz 2021). In line with this need for research, the aim of this experimental online study is to further our understanding of how insurers can increase consumers' willingness to engage in healthy behaviors via the design of their PAYL plans. Specifically, the study examines how offering rewards for high-frequency or low-frequency activities (type of activity rewarded) and including or not including elements of social interaction within these plans influences consumers' health behavior intentions, their attitudes to PAYL plans, and privacy concerns around the sharing of their data. A further contribution to the literature stems from the study's findings on behavioral mechanisms and covariables that affect consumers' health behavior intentions, such as their health consciousness, their attitudes to PAYL plans, perceived behavioral control, subjective norms, and gender.

Section 2 of this paper sets out hypotheses drawing on an analysis of the theoretical background to the research question outlined above. Section 3 outlines the methods used in the experimental study with which we tested our hypotheses and details its findings. Concluding, Section 4 discusses the findings' theoretical and practical implications and notes potential ways forward for research into this matter.

2. Theoretical Background

2.1 *Type of Activity Rewarded*

Designing a PAYL plan will invariably entail identifying and defining the types of preventive and health-promoting activities the plan will reward. Scherenberg and Greiner (2008b) draw a general distinction between outcome-centered and behavior-centered types of activities in this context, dividing the latter into high-frequency and low-frequency activities. Rewards for outcome-centered activities are given primarily for indicators of health status, making quantitative metrics, or the “success” dimension of health-related activities (i.e. the achievement of a particular aim) (Scherenberg and Greiner 2008b). Outcome-centered indicators include a healthy body mass index (BMI) and non-smoking status, alongside quantitative values such as blood pressure, blood sugar, and cholesterol. Programs may also reward the achievement of an award for a particular level of performance as an amateur in sporting activities and the carrying of a bone marrow or organ donor card (Scherenberg and Greiner 2008b). There are concerns among researchers around the use of outcome-centered health data because they reward, not health-promoting behaviors per se, but instead the insured individual's health status, which is potentially discriminatory against people who cannot meet the relevant requirements due to a health condition, disability, or other issue (Knaack 2007; Scherenberg and Greiner 2008a). The upshot of these considerations is the increasing replacement of outcome-centered by behavior-centered indicators. An example is the PAYL-based bonus program run by Techniker Krankenkasse (2023), which rewards consumer engagement with various health and nutrition courses rather than a healthy BMI, and uptake of an online “health coach” for non-smokers rather than non-smoking status in itself.

Given the limitations of outcome-oriented metrics, we have chosen in this paper to consider behavior-centered activities, which we define as qualitative types of health-related activity that a PAYL plan rewards independently of their outcome dimension (Scherenberg and Greiner 2008b). As noted above, Scherenberg and Greiner (2008a; 2008b) distinguish between activities that, in order to benefit health, need to take place at shorter or longer time intervals. Low-frequency activities require insured individuals to engage in a one-off or, for example, an

nual health-promoting behavior. We can subdivide these activities into three categories: preventive care, sports, fitness and exercise, and health-related voluntary activities. Low-frequency activities predominantly pertain to preventive care; examples include screening tests for cancers, prenatal/maternity care, checkups for children and young people, dental checkups, professional dental cleaning, vaccinations, and preventive general medical checkups. Low-frequency sports, fitness and exercise activities might entail taking part in a sporting event or competition, such as a running race or an organized cycling tour. Other low-frequency activities, such as attendance at a first aid course and blood or plasma donation, are classifiable as health-related voluntary activities. Numerous PAYL-based bonus programs run by German statutory health insurers (e.g. AOK PLUS, BARMER, Techniker Krankenkasse) and the PAYL plans offered by Generali Vitality (Germany) and UNIQA (Austria) reward low-frequency activities.

Contrastingly, high-frequency activities require people to engage in health-promoting behaviors that take place more often. High-frequency activities are categorizable as preventive care or sports, fitness and exercise-related. Examples of such activities in the preventive care category include long-duration health education courses and health coaching on subjects such as relaxation techniques, exercise, nutrition, and smoking cessation. High-frequency sports, fitness and exercise activities could be gym or sports club memberships and involvement in sporting activities at university or work. Sports, fitness and exercise activities measured with wearables and activity trackers are also classified as high-frequency activities (Scherenberg and Greiner 2008a). In this context, for example, Techniker Krankenkasse (2023) rewards its policyholders if they walk at least 60,000 steps per week or cycle at least 40 km per week in ten out of twelve weeks. Insurers similarly providing PAYL plans that engage consumers in various high-frequency activities include Generali Vitality (Germany), SWICA (Switzerland) and John Hancock (U.S.).

We expect health behavior intentions to increase more markedly when a PAYL plan rewards high-frequency activities than when low-frequency activities are the subject of rewards. In this context, we apply the principles of construal level theory (Trope and Liberman 2010), which considers the link between psychological distance and mental abstraction. When an individual's psychological distance from a particular topic, event, or concern is high, as is the case when the matter in question is distant in time, mental abstraction is also high, and vice versa. For our context, this means that events separated by short time intervals – such as high-frequency activities – result in low levels of mental abstraction in the individual. The resulting greater frequency of high-frequency activities, such as step tracking and physical activity, prompts consumers to adopt health-promoting behaviors to a greater degree than does the less imminent frequency of low-frequency activities such as preventive medical checkups. In view of these considerations, we propose the following hypothesis:

- H₁.** Consumers express stronger health behavior intentions when a PAYL plan rewards high-frequency activities than when low-frequency activities are the subject of rewards.

2.2 Elements of Social Interaction

Elements of social interaction are a form of motivational design mechanism implemented in systems and services that aims to motivate users to engage with a given task. Hamari et al. (2018) distinguish three classes of motivational design: (1) gamification, (2) quantified-self and (3) social networking features, such as elements that include or entail social interaction. Gamification employs mechanisms familiar from games, such as points, badges, and leaderboards (Hamari et al. 2018; Hamari and Koivisto 2014; Morschheuser et al. 2017). Quantified-self features use tracking technology to record, in quantitative metrics, an individual's personal performance toward behavioral, environmental, and biological achievements; people's increasing use of smart watches and activity trackers has given rise to what is known as the quantified-self movement (Lupton 2016; op den Akker et al. 2014; Zuckerman and Gal-Oz 2014). Social networking services including Facebook, Twitter, and Instagram often incorporate features that provide for and constitute forms of social interaction, such as messaging, virtual cheers, and communities. The interaction that takes place through these media can be with peers or non-peers, and can happen at any time and in any place (Hamari et al. 2018). Zhu et al. (2017) distinguish between "social sharing" and "social competing" as two types of social interactivity in this context. Social sharing enables individuals to share data on their fitness, such as distance covered and heart rate, or their feelings about physical activity with a network of friends or followers such as an online community. Social competing entails individuals sharing the data gained from tracking technology for comparison and competition with the values attained by others, as in, for example, a leaderboard. This mechanism in particular shows an overlap between the three classes of motivational design outlined above. What they have in common is their capacity to serve as social or verbal incentives that aim to support consumers' intrinsic motivation (Deci et al. 1999; Johnson et al. 2016; Pereira et al. 2014).

Work by various scholars has demonstrated the positive influence that elements of motivational design can exert on health-promoting intentions. Gamification can encourage increased uptake of physical exercise and healthy eating habits (Johnson et al. 2016; Jones et al. 2014; Pereira et al. 2014). Quantified-self technologies make performance visible and are beneficial to the maintenance of practices over time (op den Akker et al. 2014). Other work confirming the positive influence of elements of social interaction on consumers' engagement in physical activity includes the studies by Hamari and Koivisto (2015) and Chen and Pu (2014).

To date, no empirical study has examined how the frequency of activities rewarded within a PAYL plan influences consumers' behaviors as regards such plans (Scherenberg and Greiner 2008b). Most studies exploring the influence of elements of social interaction have centered on physical activity (Hamari and Koivisto 2015; Zhu et al. 2017; Zuckerman and Gal-Oz 2014), although Zhu et al. (2017) propose to investigate social interaction in the context of activities taking various different forms. We expect the inclusion of elements of social interaction in a PAYL plan to amplify the effect of rewarding high-frequency activities on consumers' health behavior intentions more markedly than the effect of rewarding low-frequency activities. With reference to the theory of planned behavior (Ajzen 1991), Zhu et al. (2017) show that individuals' attitudes, the subjective norms they recognize, and perceived behavioral control mediate the impact of elements of social interaction on their intention to exercise. Attitudes describe a person's evaluation or appraisal of the consumer behavior in question. The concept of "subjective norms" refers to the pressure or expectation an individual perceives to perform or not perform a certain behavior. Perceived behavioral control describes the degree to which an individual perceives performing a particular behavior as easy or difficult for them (Ajzen 1991). Accordingly, we expect the combination of high-frequency activities and elements of social interaction effects a particularly strong increase in pressure to engage in healthy behaviors; therefore, we assume the use of elements of social interaction within a PAYL plan to moderate the influence of the type of activity rewarded on consumers' health behavior intentions. If this expectation is accurate, this would mean that health behavior intentions are stronger when i) a PAYL plan rewards high-frequency activities and includes elements of social interaction, and ii) when the plan rewards low-frequency activities, but does not include any elements of social interaction. We thus propose a further hypothesis as follows:

H₂. Elements of social interaction moderate the influence of the type of activity rewarded in PAYL plans on consumers' health behavior intentions. Consumers state stronger health behavior intentions when a PAYL plan i) rewards high-frequency activities and includes elements of social interaction, and when it ii) rewards low-frequency activities and does not contain social interactivity.

In other words, our study's conceptual framework proposes that the type of activity a PAYL plan rewards influences consumers' health behavior intentions and that the presence or absence of social interactivity moderates this influence (see Fig. 1).

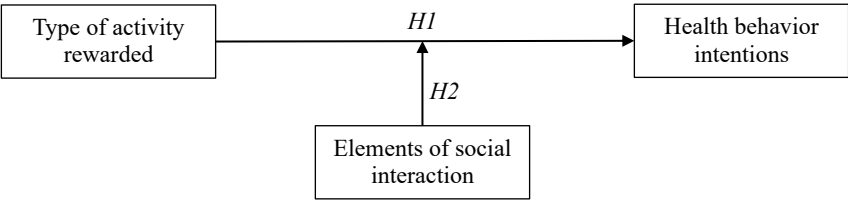


Fig. 1: Conceptual framework

3. Experimental Study

3.1 Method

Four hundred and forty-eight students at a German university (66.7 % female, mean age = 23.2 years) took part in this online experiment. The participants were randomly assigned to one of four conditions of a 2 (type of activity: low-frequency vs. high-frequency) × 2 (elements of social interaction: present vs. absent) between-subjects design in which they were asked to imagine they were looking for a new health insurance provider and were given information about a PAYL plan offered by a fictitious health insurer. Participants in the low-frequency activity conditions were told that the PAYL plan rewarded low-frequency health-promoting activities such as attendance at preventive medical checkups and cancer screenings, preventive dental care, and professional teeth cleaning. Contrastingly, those in the high-frequency activity conditions received information on rewards for high-frequency health-promoting activities, such as completing at least 60,000 steps per week as ascertained by step tracking, sports club/gym membership, and attendance at long-duration courses or classes on health promotion topics. Participants in the social interactivity conditions read that the PAYL plan would offer them the opportunity to share information on their health-promoting activities with friends and family using an app provided by the fictitious insurer. Participants in the conditions without elements of social interaction did not receive this information. Tab. A.2 and Figs. A.1–A.4 in the Appendix provide an overview of scenarios used.

Measures: We measured participants’ health behavior intentions using three items adapted from Courneya et al. (1999) (1 = not motivated at all/do not intend to at all/not committed at all; 7 = very motivated/intend to very strongly/very committed). Alongside this, we assessed participants’ health consciousness (Gould 1988) using a 5-point scale rating the extent to which various habits and behaviors characterized them (1 = does not describe me at all, 2 = describes me a little, 3 = describes me partly, 4 = describes me well, 5 = describes me very well). We measured participants’ attitudes to PAYL plans using a semantic dif-

ferential scale (Park and John 2014). A seven-point scale served to ascertain participants' perceived behavioral control (1 = very difficult/no control at all/strongly disagree; 7 = very easy/complete control/strongly agree; Ajzen and Madden 1986). We similarly used 7-point scales (1 = strongly disagree, 7 = strongly agree) to control for the subjective norms participants recognize (Courneya et al. 1999), their perceived enjoyment of activities associated with the PAYL plan (Holsapple and Wu 2007; Venkatesh 2000), and their privacy concerns around PAYL plans (Bleier and Eisenbeiss 2015). Additionally, we collected information on participants' age, gender, and socioeconomic status. Tab. A.1 in the Appendix provides an overview of the scales used.

3.2 Results

Manipulation check: We asked participants whether the fictitious health insurer shown rewarded high-frequency or low-frequency activities within its PAYL plan. Similarly, we asked whether the fictitious health insurer offered them the opportunity to share health-related information with friends and family using an app. We eliminated participants who failed this manipulation check by answering these questions incorrectly, alongside those participants who failed an attention test or had shown low self-assessed accuracy of responses. Further participants we eliminated were those who did not agree to the inclusion of their responses in the analysis and those who gave implausible information on their age. The total number of participants excluded was 115¹. The final sample encompassed 333 participants (67.6 % female, mean age = 23.1 years).

Type of activity rewarded and elements of social interaction: We used an ANCOVA to analyze the main effect of the type of activity rewarded and of the interaction between the type of activity rewarded and the inclusion of elements of social interaction on participants' health behavior intentions, while controlling for health consciousness, attitudes to PAYL plans, perceived behavioral control, subjective norms, and gender. The results indicate that the type of activity rewarded significantly influences participants' health behavior intentions $F(1,324) = 3.933$; $p = 0.048$). The prospect of rewards for high-frequency activities reinforces consumers' health behavior intentions more markedly than does an anticipated reward for low-frequency activities ($M_{\text{high}} = 5.33$ and $M_{\text{low}} = 5.17$; $p = 0.048$) (see Fig. 2). These findings support *H1*.

¹ Failed manipulation check ($n = 78$); failed attention test ($n = 33$); low self-assessed accuracy of responses ($n = 1$); non-consent to our use of responses ($n = 2$); implausible information on age ($n = 1$).

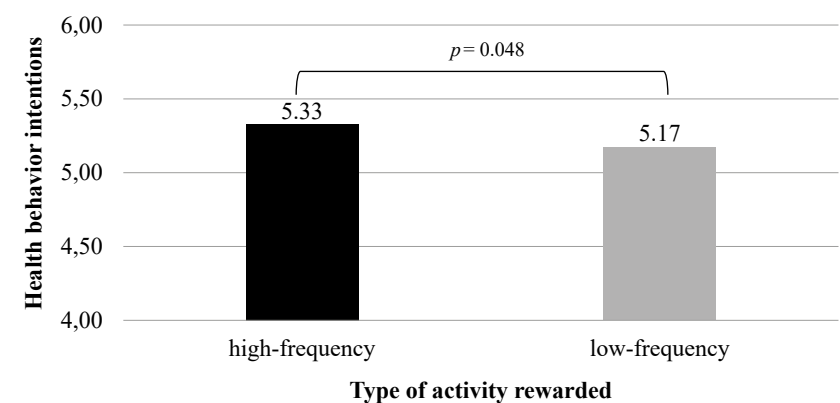


Fig. 2: Mean values on health behavior intentions for the types of activity rewarded

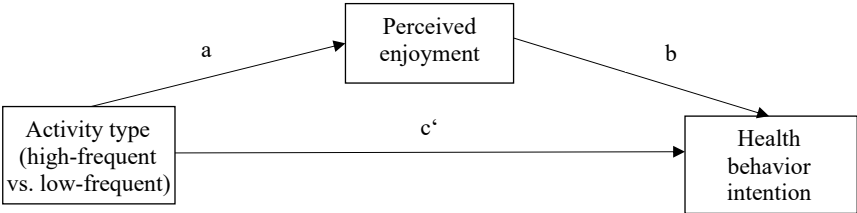
Contrastingly, the ANCOVA did not find elements of social interaction to significantly influence consumers’ health behavior intentions ($F(1,324) = 0.001$; $p = 0.969$). Further, there is no significant interaction effect on consumers’ health behavior intentions between the type of activity rewarded and social interactivity ($F(1,324) = 0.963$; $p = 0.327$). Our findings therefore fail to substantiate hypothesis *H2*.

Additional findings: We conducted additional analyses to identify the existence and extent of any mediating role of consumers’ attitudes and privacy concerns around PAYL plans and of their perceived enjoyment of the activities associated with them.

A mediation analysis² revealed a significant indirect effect of the type of activity rewarded on consumers’ health behavior intentions, as mediated by perceived enjoyment (estimated coefficient = -0.139 ; CI excludes zero [$-0.229, -0.064$]) (see table 1). We therefore find that consumers’ perceived enjoyment mediates the effect of the type of activity rewarded on health behavior intentions. The higher the perceived enjoyment of a specific type of activity, the more strongly consumers endeavor to adopt healthy behaviors. In addition, the results of an independent samples t-test show that participants perceive significantly greater enjoyment in high-frequency activities than in low-frequency activities ($M_{\text{high}} = 4.03$ and $M_{\text{low}} = 3.09$; $p = 0.000$).

² We used a bootstrapping approach, with 5,000 resamples and Model 4 of the SPSS PROCESS macro, for the mediation analysis; type of activity rewarded was the predictor variable, health behavior intention was the dependent variable, and perceived enjoyment served as the mediator.

Table 1
Mediation analyses



						<i>CI₉₅</i>	
Predictor	Criterion	Path	Est.	SE	P	LL	UL
X1: activity type	M: PE	a	-.943	.198	.000	-1.333	-.553
X1: activity type	Y: HBI	c'	-.029	.119	.809	-.264	.206
M: PE		b	.147	.032	.000	.084	.210
Indirect effect:		a x b	-.139	.042	.000	-.229	-.064
Total effect:		a x b + c'	-.168	.119	.160	-.402	.067

Note: *n* = 333, with 5,000 bootstrapped samples. Measures of mediator (M) and outcome (Y) were not standardized prior to the analysis. Activity type (X1) is coded as 1 = high-frequent activities, 2 = low-frequent activities. Unstandardized coefficients (Est.) and their standard error (SE) are shown.

We additionally carried out a regression analysis to investigate the direct effect of consumers’ attitudes, perceived behavioral control, and subjective norms on their health behavior intentions. The theory of planned behavior (Ajzen 1991) asserts that an individual’s attitudes, the subjective norms they recognize, and their perceived behavioral control are determinants of their intention to perform a desired behavior. Our findings show that the more positive consumers’ attitudes to PAYL plans are ($\beta = 0.315$, $t = 6.542$, $p = 0.000$) and the more strongly they perceive subjective norms in relation to the health behaviors the plan rewards ($\beta = 0.107$, $t = 2.539$, $p = 0.012$), the stronger their intentions to adopt health behaviors are. However, there is no significant direct effect between participants’ perceived behavioral control and their health behavior intentions ($\beta = 0.089$, $t = 1.545$, $p = 0.123$).

We carried out supplementary analyses with the purpose of increasing our understanding of factors that might influence consumers’ attitudes to PAYL plans as antecedents of health behavior intentions. Conducting an ANCOVA enabled us to analyze the effect of the type of activity rewarded, social interactivity, and their interaction on participants’ attitudes to PAYL plans, while controlling for perceived behavioral control and subjective norms. The results do

not indicate any significant direct effect of the type of activity rewarded ($F(1,327) = 0.106$; $p = 0.745$) or of elements of social interaction ($F(1,327) = 0.145$; $p = 0.704$) on participants' attitudes to PAYL plans. However, as Fig. 3 demonstrates, the ANCOVA shows a significant interaction effect on consumers' attitudes to PAYL plans between elements of social interaction and the type of activity rewarded ($F(1,327) = 4.213$; $p = 0.041$). This means that elements of social interaction moderate the influence of the type of activity rewarded on attitudes to PAYL plans. In particular, we found that participants in the high-frequency activity treatments who were told that their health-related information is visible only to them exhibit more positive attitudes to PAYL plans ($M_{\text{absent}} = 5.07$) than do participants in these treatments who were informed of the opportunity to share their health-related information with others ($M_{\text{present}} = 4.76$). The opposite is observable with participants in the low-frequency activity treatments, whose attitudes to PAYL plans are more positive when told of possibilities for sharing health-related data with others than when advised that this information would remain private ($M_{\text{absent}} = 4.85$ vs. $M_{\text{present}} = 5.06$).

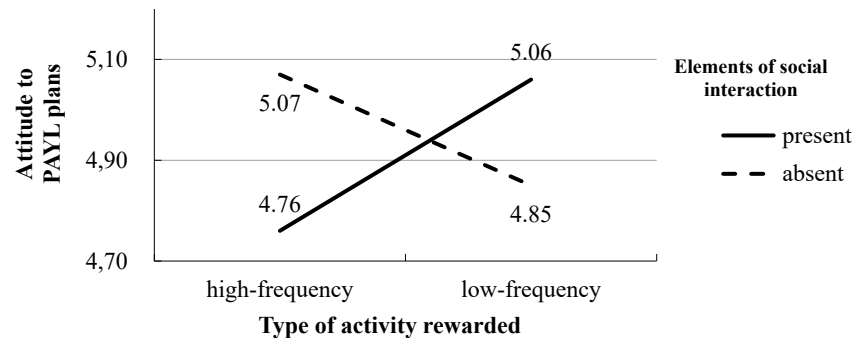


Fig. 3: Interaction effect of type of activity rewarded and elements of social interaction on consumers' attitudes to PAYL plans

A regression analysis further demonstrates a significant negative effect of privacy concerns around PAYL plans ($\beta = -0.248$, $t = -8.016$, $p = 0.000$) and a significant positive effect of perceived behavioral control ($\beta = 0.261$, $t = 4.424$, $p = 0.000$) and subjective norms ($\beta = 0.110$, $t = 2.506$, $p = 0.013$) on consumers' attitudes to PAYL plans. An ANOVA shows a significant interaction effect on privacy concerns between the type of activity rewarded and the inclusion of elements of social interaction ($F(1,329) = 5.260$; $p = 0.022$). Participants in the high-frequency activity treatments report greater privacy concerns when elements of social interaction are present ($M_{\text{present}} = 4.67$) than when they are absent ($M_{\text{absent}} = 4.04$). By contrast, the privacy concerns of participants in the

low-frequency activity treatments who were advised that their health-related information would remain private were marginally greater ($M_{\text{absent}} = 4.21$) than those of participants in these treatments who were told of opportunities to share their data ($M_{\text{present}} = 3.92$) (see Fig. 4).

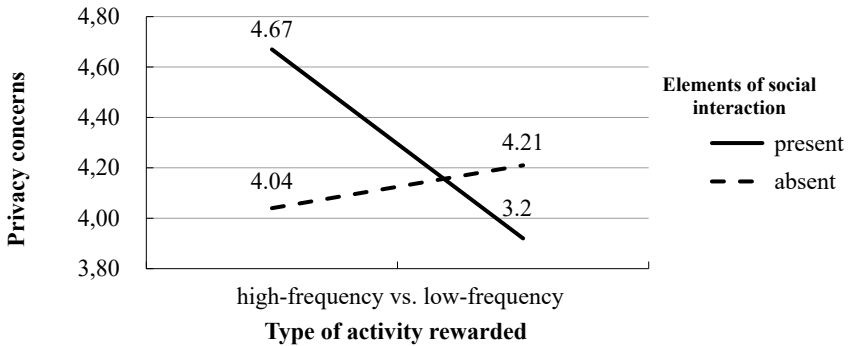


Fig. 4: Interaction effect of type of activity rewarded and elements of social interaction on consumers' privacy concerns around PAYL plans

4. General Discussion

The results of our study contribute to scholars' and practitioners' knowledge around the implementation of PAYL plans and are thus of relevance to any insurer providing such plans to customers. The study's central focus was the effect of the type of activity rewarded and of the inclusion of social interactivity within a PAYL plan on consumers' health behavior intentions.

4.1 Theoretical Implications

Our experimental study investigated the extent to which the type of activity a PAYL plan rewards – defined as low-frequency or high-frequency activities in accordance with the intervals at which an insured person has to engage in them to receive a reward – increases consumers' health behavior intentions. We further explored the degree to which the presence (as opposed to the absence) of elements of social interaction in a PAYL plan moderated the influence of the type of activity rewarded on consumers' health behavior intentions. Our findings reveal a significant main effect of rewarding high-frequency activities within a PAYL plan on consumers' health behavior intentions, confirming hypothesis *H1*. Perceived enjoyment mediates this effect; our study finds that participants perceive greater enjoyment in high-frequency than in low-frequency activities. Contrastingly, the results fail to substantiate hypothesis *H2*, finding no

significant interaction effect on consumers' health behavior intentions between the type of activity rewarded and elements of social interaction. Specifically, consumers promised rewards for high-frequency activities do not express significantly greater determination to engage in health-promoting behaviors when elements of social interaction are present than in their absence. Participants' high perceived privacy concerns in relation to high-frequency activities in combination with elements of social interaction may account for this finding. Privacy concerns have a negative influence on consumers' attitudes to PAYL plans. Moreover, the more positive consumers' attitudes to PAYL plans, the stronger the health behavior intentions they indicate. Our study therefore contributes to the literature by confirming the attitude-intention link postulated by the theory of planned behavior (Ajzen 1991).

Elements of social interaction additionally appear to moderate the influence of the type of activity rewarded on consumers' attitudes to PAYL plans. Attitudes are more positive when high-frequency activities are the subject of rewards and social interactivity is absent. Conversely, the use of elements of social interaction in combination with rewards for low-frequency activities correlates with marginally more favorable attitudes to PAYL plans.

4.2 Managerial Implications

This study gives rise to a number of practical implications for health insurers in relation to the design of PAYL plans. Generally speaking, the provision of PAYL plans may serve as a successful consumer satisfaction and retention strategy because of the opportunity they entail for individuals to influence and effectively customize the plan (Coelho and Henseler 2012); consumers whose insurance policies incorporate PAYL elements will be less likely to switch to another health insurer because doing so would mean they lost the points they had previously accumulated for health-promoting activities and therefore the prospect of rewards. PAYL plans are also likely to attract new consumers who already value a health-promoting lifestyle and may therefore enable insurers to form smaller, more homogenous risk pools (Eling and Kraft 2020).

The study's results give indications of how specific types (frequencies) of activity and elements of social interaction within PAYL plans might support or reinforce consumers' health-promoting behaviors. The greater enjoyment our participants appear to associate with high-frequency than with low-frequency activities could prompt insurers to include rewards for high-frequency activities when designing PAYL plans with the purpose of inducing consumers to engage in health-promoting behaviors. In light of the strong link between attitudes, intentions, and behavior, various scholars (Berger et al. 1994; Lee 2012) have noted the utility of seeking to alter consumer attitudes before attempting to in-

fluence their behavioral decisions. In line with this, our empirical findings would suggest that insurers should avoid incorporating elements of social interaction into PAYL plans that reward high-frequency activities, as the absence of such elements could positively influence consumers' attitudes to these PAYL plans and thus their health behavior intentions. This point is especially relevant to consumers who express substantial privacy concerns around sharing their health-related information. More generally, it is essential to take consumers' privacy concerns into account when designing PAYL plans, not least due to the influence of these concerns on potential customers' attitudes to policies of this type. Insurers should address consumers' concerns about their health-related data by implementing solutions for increased data protection and security. Wiegard et al. (2019) suggest that insurers, and manufacturers of wearables need to work together on this issue.

4.3 Limitations and Future Research Directions

Our study has a number of limitations which open up opportunities for future research. First, further work in this area might usefully explore consumers' responses to plans that reward both low-frequency and high-frequency activities, as our study investigated these distinct types of activity separately. Such a diversification in the types or frequencies of activities rewarded would be in line with the observation made by the German Federal Ministry of Health (2023) that disease prevention, risk reduction, and delaying the onset of health conditions necessitate a combination of primary, secondary, and tertiary preventive action. Primary prevention aims to avert the development of disease by promoting healthy lifestyles, including physical activity and a healthy diet. Secondary prevention seeks to detect diseases early and includes measures such as medical checkups. The purpose of tertiary prevention is to mitigate the consequences of disease and stop existing diseases from worsening or relapsing.

Second, future studies should consider investigating forms of social interactivity beyond the social sharing mechanisms at the center of this study. It may be the case that incentives based on social competing might influence consumers' attitudes to PAYL plans more markedly. In this context, it is possible that the strength of social ties may have an impact on the effectiveness of elements of social interaction. Ryu and Feick (2007) distinguish strong ties, such as those between spouses or close friends, from weak ties, such as those between more casual acquaintances. According to Lee et al. (2019), perceived enjoyment rises in direct proportion to the strength of social ties. The effectiveness of elements of social interaction may therefore depend on the strength of the ties connecting users to those with whom they are sharing their health-related information. A further potential subject for investigation in this regard is individual versus joint

scoring; the process of accumulating points as a group may reinforce subjective norms and thus exert a greater influence on behavioral intentions than the attainment of points on an individual basis (Chen and Pu 2014). Besides elements of social interaction, future work might also consider more generally evaluating the effect of gamified elements of PAYL plans, such as rewards and point systems, on consumers' health behavior intentions, due to the fact that gamification mechanisms target intrinsic motivation. Examples of such mechanisms include points, achievements, badges, medals, and likes. It may also prove useful to consider differences between rewards given immediately upon the completion of a specific activity and those delivered for the accumulation of multiple activities and corresponding points (Lewis et al. 2016).

Third, going forward, we would welcome research in this area that explores the optimum design of PAYL plans with more heterogeneous samples. The sample in this study consisted primarily of young, female students, and as such is not representative of all groups targeted by PAYL plans. It may be advisable to study differences in attitudes and intentions among divergent age groups and people with various educational backgrounds. Future studies may also benefit from measuring people's actual health behaviors; our study ascertained behavioral intentions only, and may thus prompt other researchers to analyze real-world physical activity and other forms of health-promoting behaviors undertaken in the context of PAYL plans.

We conclude with a recommendation to researchers to investigate ethical, legal, and technical issues around the successful implementation of PAYL plans on the market (Eling and Kraft 2020). Ethical difficulties may arise from the risk that such plans could discriminate against and effectively "punish" consumers in poor health; diseases do not always stem from unhealthy lifestyles. The highly sensitive nature of the health-related data collected within PAYL plans gives rise to an imperative to thoroughly explore legal issues around their protection and security. A key technical challenge, meanwhile, consists in developing solutions for PAYL plans that minimize the risk that health-related data will become subject to manipulation or abuse (Eling and Kraft 2020).

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Appendix

Table A.1
Measures used for the experimental study³

		Item	Scale
Health behavior intentions (adapted from Courneya et al. 1999)	HBI1:	How motivated are you to behave in a health-conscious manner?	1 = not motivated at all; 7 = very motivated
	HBI2:	How strongly do you intend to do everything you can to behave in a health-conscious manner?	1 = do not intend to at all; 7 = intend to very strongly
	HBI3:	How committed are you to behaving in a health-conscious manner?	1 = not committed at all; 7 = very committed
Health consciousness (adapted from Gould 1988)	HC1:	I reflect on my health a lot.	1 = does not describe me at all; 2 = describes me a little; 3 = describes me partly; 4 = describes me well; 5 = describes me very well; 6 = not specified
	HC2:	I'm very conscious about my health.	
	HC3:	I'm generally attentive to my inner feelings about my health.	
	HC4:	I'm constantly examining my health.	
	HC5:	I'm alert to changes in my health.	
	HC6:	I'm usually aware of my health.	
	HC7:	I'm aware of the state of my health as I go through the day.	
	HC8:	I notice how I feel physically as I go through the day.	
	HC9:	I'm very involved with my health.	
Attitude to PAYL plans (adapted from Park and John 2014)	ATA1:	behavior-based health insurance is __	1 = bad; 7 = good
	ATA2:	behavior-based health insurance is __	1 = unfavorable; 7 = favorable
	ATA3:	behavior-based health insurance is __	1 = negative; 7 = positive
	ATA4:	behavior-based health insurance is __	1 = unreliable; 7 = reliable

(Fortsetzung nächste Seite)

³ The survey questions are translated from German.

(Fortsetzung Table A.1)

		Item	Scale
	ATA5:	behavior-based health insurance is __	1 = untrustworthy; 7 = trustworthy
	ATA6:	behavior-based health insurance is __	1 = not credible; 7 = credible
	ATA7:	behavior-based health insurance is __	1 = uninformative; 7 = informative
	ATA8:	behavior-based health insurance is __	1 = not at all useful; 7 = very useful
Perceived behavioral control (adapted from Ajzen and Madden 1986)	PBC1	Regular physical activity for me is...	1 = very difficult; 7 = very easy
	PBC2	How much control do you have over yourself to be physically active on a regular basis?	1 = no control at all; 7 = complete control
	PBC3	If I wanted to, I could easily engage in regular physical activity.	1 = strongly disagree; 7 = strongly agree
	PBC4	Attending health screenings is...	1 = very difficult; 7 = very easy
	PBC5	How much control do you have over yourself to notice preventive medical checkups?	1 = no control at all; 7 = complete control
	PBC6	If I wanted to, I could easily attend health screenings.	1 = strongly disagree; 7 = strongly agree
Subjective norms (adapted from Courneya et al. 1999)	SN1	Most people I care about encourage me to exercise regularly.	1 = strongly disagree; 7 = strongly agree
	SN2	Most people I care about think I should exercise regularly.	
	SN3	Most people I care about support me doing regular physical activity.	
	SN4	Most people I care about encourage me to attend health screening tests.	
	SN5	Most people I care about think I should attend health screening tests.	
	SN6	Most people I care about support me in attending health screening tests.	
Attention test	AT1	Please do not specify any of the options in the following category; instead just click the „Next“ button at the bottom of the page. This is a test of whether you are reading the questions carefully.?	1 = strongly disagree; 7 = strongly agree
Perceived enjoyment (adapted from Holsapple and Wu 2007; Venkatesh 2000)	PE1	Using the HealthPlus app to interact with friends and other people I know (e.g. in a community or via sharing activities) would be fun for me.	1 = strongly disagree; 7 = strongly agree
	PE2	Using the HealthPlus app to interact with friends and other people I know (e.g. in a community or via sharing activities) would be exciting.	

		Item	Scale
	PE3	Using the HealthPlus app to interact with friends and other people I know (e.g. in a community or via sharing activities) would enrich my life.	
	PE4	I find the idea of using the HealthPlus app to interact with friends and other people I know (e.g. in a community or via sharing activities) interesting.	
Privacy concerns (company's potential misuse of information) (adapted from Bleier and Eisenbeiss 2015)	PC1:	It bothers me that the insurance provider would be able to track health related information about me.	1 = strongly disagree; 7 = strongly agree
	PC2:	I am concerned that the insurance provider may end up holding too much health-related information about me.	
	PC3:	It bothers me that the insurance provider would be able to access health related information about me.	
	PC4:	I am concerned that my health-related information could be used in ways I could not foresee.	
Manipulation check: Type of activity rewarded	MC1:	What activities does the HealthPlus health insurance provider reward?	Everyday health-related activities (e.g. steps, sports club/gym membership) / Attendance at preventive medical checkups / I can't remember
Manipulation check: elements of social interaction	MC2:	Offers the health insurer the opportunity to share health-related information with friends and family using an app?	Yes / No / I can't remember
Accuracy of responses (self-assessed)	AA1:	I have answered the questions very accurately.	1 = strongly disagree; 7 = strongly agree
Use Me Item	UMI1	Do we have your permission to use the information you have given us in this questionnaire for a scientific study?	Yes / No


Table A.2
Scenarios used for the experimental study⁴

<p>Please now put yourself in the following situation:</p> <p>Scenarios A, B, C & D: <i>high-frequency activity & elements of social interaction present vs low-frequency activity & elements of social interaction present vs high-frequency activity & elements of social interaction absent vs low-frequency activity & elements of social interaction absent</i></p> <p>Imagine that you would like to switch to a new health insurance provider and are therefore currently looking for one (for example, because you will soon be completing your degree and taking on a graduate job, thus dropping out of your parents' family insurance).</p> <p>You have become aware of a product offered by the health insurer HealthPlus*. Please assume that some of your friends are already insured with HealthPlus. HealthPlus health insurance rewards you for your everyday exercise habits (such as number of steps completed each day or playing sports) [annual attendance at preventive examinations (such as cancer screening tests, dental checkups)].</p> <p>You will need to record your everyday exercise habits using a fitness tracker or smartwatch and document it [your attendance at preventive examinations] in an app.</p> <p>The HealthPlus app encourages social interaction. It lets you share your everyday exercise habits [your attendance at health screenings] with your friends, other people you know, or other members of the HealthPlus program.</p> <p>[Information on your everyday exercise habits [on your attendance at health screenings] is only visible to you and is not shared with other members, friends or acquaintances].</p> <p>Take a look:</p> <p style="text-align: center;">***</p> <p>Fig. A.1: <i>high-frequency activity & elements of social interaction present</i></p> <p>Fig. A.2: <i>low-frequency activity & elements of social interaction present</i></p> <p>Fig. A.3: <i>high-frequency activity & elements of social interaction absent</i></p> <p>Fig. A.4: <i>low-frequency activity & elements of social interaction absent</i></p> <p style="text-align: center;">***</p> <p>Please note: There are no differences between the HealthPlus product and those of other health insurance providers in terms of the level of insurance cover (e.g. for medical and dental treatment and psychotherapy) and the monthly premium due.</p> <p>* fictitious provider</p>

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Enjoy a healthy everyday lifestyle, connect with friends and earn rewards with HealthPlus health insurance

It's so easy:

1. 


Enjoy a healthy everyday lifestyle

Track your everyday health-related activities, such as completing 60,000 steps per week, sports club/gym membership, and doing courses on health topics. Document your activities in the HealthPlus app.

2. 

Connect with friends

Use the HealthPlus app to interact with friends, sharing your successes, tackling challenges and motivating one another. There's also room in your private friends group for a group leaderboard and the opportunity to share ideas for a healthy lifestyle.

3. 

Earn rewards

HealthPlus rewards you for your healthy everyday lifestyle! For each challenge you complete (such as a 30-day step challenge), you earn 100 points (= €10). We'll deduct your reward directly from your health insurance premium.

Fig. A.1: High-frequency activity & elements of social interaction present

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Life Issues

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It's so easy:

1.

Attend health checkups and screenings

Go to recommended preventive checks such as cancer screening tests, general health checkups, dental checkups and professional teeth cleaning. Document your checkups in the HealthPlus app.

2.

Connect with friends

Use the HealthPlus app to interact with friends, sharing successes and motivating one another. Your private friends group gives you the opportunity to talk about ideas for a healthy lifestyle.

3.

Earn rewards

HealthPlus rewards you for your healthy lifestyle! For every preventive checkup you attend, you earn 100 points (= €10). We'll deduct your reward directly from your health insurance premium.

Fig. A.2: Low-frequency activity & elements of social interaction present

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Enjoy a healthy everyday lifestyle and earn rewards with HealthPlus health insurance

It's so easy:

1.

Enjoy a healthy everyday lifestyle

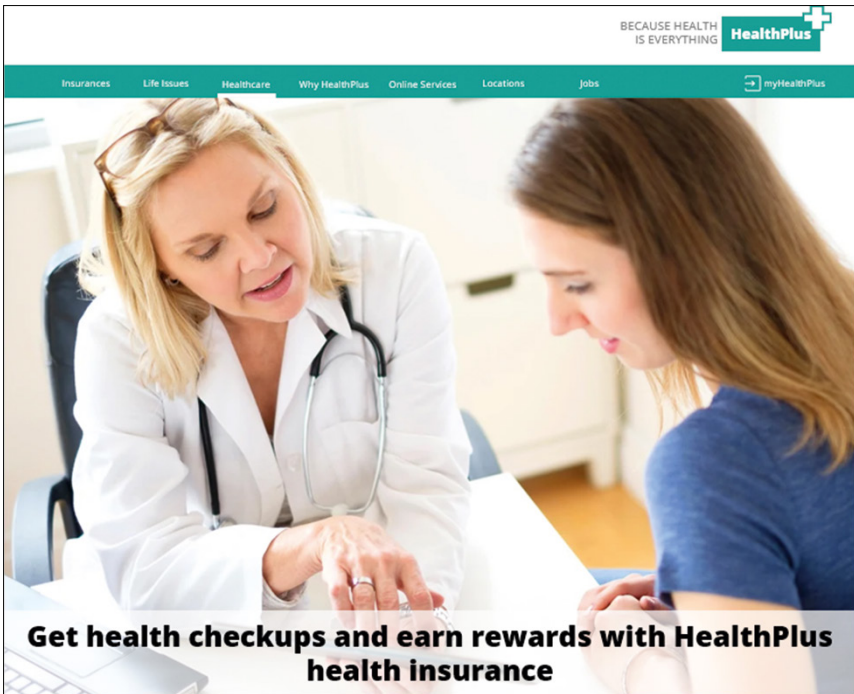
Track your everyday health-related activities, such as completing 60,000 steps per week, sports club/gym membership, and doing courses on health topics. Document your activities in the HealthPlus app.


2.


Earn rewards

HealthPlus rewards you for your healthy everyday lifestyle! For each challenge you complete (such as a 30-day step challenge), you earn 100 points (= €10). We'll deduct your reward directly from your health insurance premium.

Fig. A.3: High-frequency activity & elements of social interaction absent




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It's so easy:

- 

Attend health checkups and screenings

Go to recommended preventive checks such as cancer screening tests, general health checkups, dental checkups and professional teeth cleaning. Document your checkups in the HealthPlus app.
- 

Earn rewards

HealthPlus rewards you for your healthy lifestyle! For every preventive checkup you attend, you earn 100 points (= €10). We'll deduct your reward directly from your health insurance premium.

Fig. A.4: Low-frequency activity & elements of social interaction absent