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Games and Recovery: The Use of Video and Computer Games to Recuperate from Stress and Strain

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Abstract

In an online survey of 1614 participants, the use of video and computer games for recovery purposes was investigated. The data indicate that games are systematically used after exposure to stressful situations and strain and that recovery experience is a significant facet of the gaming experience. Using structural equation modelling, the relations among work-related fatigue, daily hassles, social support, coping style, recovery experience, and the use of video and computer games for recovery purposes were tested. Persons who associated stronger recovery experiences with game play used video and computer games more often after stressful and exhausting situations. Additionally, participants' level of work-related fatigue and exposure to daily hassles were both positively associated with the use of games for recovery. Participants with emotion focussed coping style showed a higher tendency to use games for recovery, than participants with problem focussed coping style. The relationship between work-related fatigue and game use for recovery purposes was moderated by social support. The stress buffering function of video and computer games was more important for participants receiving less social support. These participants showed a stronger relation between work-related fatigue and the use of games for recovery than participants receiving more social support.

Games and Recovery: The Use of Video and Computer Games to Recuperate from Stress and Strain

A growing body of research is concerned with the use of entertaining media as a means of self-regulation. Media users adapt their usage patterns to their current personal situation. Individuals who are less satisfied with their lifes and report lower well-being tend to watch more television than people who report less frustration or stress (Anderson, Collins, Schmitt, & Smith Jacobvitz, 1996; Espe & Seiwert, 1987; Kubey & Csikszentmihalyi, 1990; Morgan, 1984). Evenings of particularly heavy exposure to television are preceded by significantly lower moods than evenings with only light television viewing (Kubey & Csikszentmihalyi, 1990). Stressful life events, such as financial problems or interpersonal conflicts, are associated with increased consumption of comedy and decreased viewing of news (Anderson, Collins, Schmitt, & Smith Jacobvitz, 1996). Research based on mood management theory (Zillmann, 1988a; Zillmann, 1988b) consistently demonstrated that media exposure alters users' mood and arousal (Bryant & Zillmann, 1984; Zillmann, 1991). According to mood management theory, media users are hedonistic agents that strive for pleasurable experiential states by arranging their stimulus environment in terms of maintaining positive and terminating negative states (Oliver, 2003; Zillmann, 1988a; Zillmann, 1988b). Psychological escapism, the wish to escape negative moods or to stop rumination on negative events or unsolved problems, is another important motivation for television use (Henning & Vorderer, 2001). The results of experimental research suggest that media exposure can indeed help users to escape negative thoughts about themselves. In an experimental study, Moskalenko and Heine (2003) revealed that exposure to television led to significant decreases in self-discrepancies.

In addition to the mass media discussed above, interactive media, especially video and computer games, are growing in relevance for entertainment research (Vorderer, Bryant, Pieper, & Weber, 2006). Since the late 1980s the market for video and computer games has

seen a constant growth in the United States (Williams, 2006a). Compared to the previous year, computer and video game software sales in the U.S. grew six percent in 2007 to $9.5 billion, and game software sales more than tripled since 1996 (Entertainment Software Association, 2008). Although research on self-regulation with video and computer games is limited, some recent studies demonstrated beneficial effects of games on self-regulatory processes. In a quasi-experiment by Reinecke and Trepte (2008), participants had the chance to play a computer game after a lengthy text correction task. Participants who played the computer game subsequently reported significantly higher levels of arousal and performed significantly better in a concentration test, than participants who did not play the game. Furthermore, data provided by Ryan, Rigby, and Pryzbylski (2006) suggest that video and computer games contribute to well-being by satisfying users' need for autonomy and competence.

Taken together, the above cited research indicates that exposure to entertaining media has a high potential to alter individuals' affective and cognitive states. Entertaining media seem to play a crucial role in many people's everyday lifes and are actively used to recuperate from emotional and cognitive exhaustion. Although all of the studies reported above touch upon certain aspects of what is termed *recovery* in working psychology (Sonnentag & Fritz, 2007), a systematic approach to investigate the recovery potential of entertaining media has not been undertaken yet (Klimmt, 2008).

The aim of the present study is to explore the recovery potential of video and computer games and to test the usefulness of the theoretical concept of recovery for media research. The subsequent section gives an introduction to the psychological concept of recovery and a review of research on the recovery process. Afterwards, potential contributions of video and computer games to recovery are discussed, and intervening variables are introduced.

The Recovery Process and Recovery Experience

In everyday life, especially in the context of work, people are confronted with numerous demands that make it necessary to allocate mental and physical resources to a task at hand. This exertion of resources and energy leads to strain reactions, which are associated with psychological and physiological fatigue and low positive affect (Fuller et al., 2003, p. 331; Rook & Zijlstra, 2006; Sluiter, van der Beek, & Frings-Dresen, 1999). Recovery refers to the processes opposite to stress and strain and can be understood as "the process of replenishing depleted resources or rebalancing suboptimal systems" (Sonnentag & Zijlstra, 2006, p. 331). To recover from job stress or other forms of strain, we need phases of rest that allow us to renew the physical and psychological resources that were utilized in the preceding situation. Consumed resources can return to a normal baseline level once the individual is no longer confronted with the demands of a task (Craig & Cooper, 1992; Meijman & Mulder, 1998). Additionally, gaining new internal resources such as energy, self-efficacy, the feeling of control, or a positive mood supports the recovery process (Hobfoll, 1989; Hobfoll, 1998; Hobfoll & Shirom, 1993). Consequently, our lifes are organized in cycles of work and rest (Zijlstra & Sonnentag, 2006). Leisure time and recreational activities are crucial for a successful recovery process (Fritz & Sonnentag, 2006; Rook & Zijlstra, 2006; Sonnentag, 2001; Sonnentag & Zijlstra, 2006; Westman & Eden, 1997). Unsuccessful or insufficient recovery and accumulated work strain are associated with a heightened risk of health problems (Sluiter, de Croon, Meijman, & Frings-Dresen, 2003; van Amelsvoort, Kant, & Swaen, 2003).

Summarizing the existing research on the recovery process, Sonnentag and Fritz (2007) identified four distinct aspects of the recovery experience:

a) Psychological detachment from work. Negative reflections and rumination about work related issues during leisure time have detrimental effects on well-being, sleep quality, and recovery (Fritz & Sonnentag, 2006; Rook & Zijlstra, 2006; Sonnentag & Bayer, 2005). Psychological detachment from work refers to "the individuals sense of being away from the

work situation" (Etzion, Eden, & Lapidot, 1998, p. 579) and to "disengage oneself mentally from work" (Sonnentag & Fritz, 2007, p. 205). Successful psychological detachment from work is related to positive affect, lower fatigue, and lower physiological activation (Brosschot, Gerin, & Thayer, 2006; Sonnentag & Bayer, 2005; Sonnentag, Binnewies, & Mojza, 2008; Sonnentag & Fritz, 2007).

b) Relaxation. Work stress and time pressure can lead to heightened physiological and psychological activation that does not stop immediately after the work demands are absent (Meijman & Mulder, 1998). Such "spillover" or after effects can last for several hours after returning home from work (Frankenhäuser, 1980; Meijman, Mulder, van Dormolen, & Cremer, 1992). Since positive mood states are associated with reduced tension and high energy (Thayer, Newman, & McClain, 1994), "slow unwinding" (Frankenhäuser, 1980, p. 213) negatively affects mood and well being. Relaxation is negatively related to work-induced fatigue and positively related to life satisfaction and serenity (Sonnentag, Binnewies, & Mojza, 2008; Sonnentag & Fritz, 2007).

c) Mastery experiences. Activities that provide challenge and learning opportunities in other, not work-related domains help to build up important internal resources, e.g., competencies and self-efficacy (Hobfoll, 1998) which support the recovery process. The beneficial influence of mastery experiences is confirmed by a study of Fritz and Sonnentag (2006) that demonstrated that mastery experiences during vacation were positively linked to recovery at the end of the holidays. Furthermore, Sonnentag, Binnewies and Mojza (2008) found a positive correlation between mastery experience during the afternoon and high levels of energy the next morning.

d) *Control*. Control is another valuable resource in the process of recovery (Hobfoll & Shirom, 1993). The feeling of control itself adds to the experiences of mastery and to self-efficacy (Bandura, 1997; Sonnentag & Fritz, 2007). Additionally, control during leisure time

is an important precondition that enables individuals to choose the specific off-job activities they prefer, and thus to engage in successful recovery (Sonnentag & Fritz, 2007).

As mentioned before, the concept of recovery experience shows a number of parallels to media effects theories that are directed at the self-regulatory use of entertaining media. Research on media use as a form of psychological escapism which tries to explain exposure to entertaining media as an attempt to escape from negative feelings and problems of everyday life (Henning & Vorderer, 2001; Kubey & Csikszentmihalyi, 1990) well connects to the recovery experience of psychological detachment. Additionally, data gathered in studies based on mood management theory demonstrate that media exposure alters mood and arousal (Bryant & Zillmann, 1984; Zillmann, 1991) and thus shows a strong connection to the recovery facet of relaxation. The concept of recover, however, goes beyond the aforementioned theories in two important ways: 1) While existing media effects theories tend to focus on isolated aspects of self-regulation (e.g. psychological detachment in research on escapism or relaxation in research on mood management) the recovery concept allows considering multiple forms of self-regulation at the same time. 2) In contrast to escapism and mood management theory which primarily conceptualize media use as the attempt to end aversive emotional or cognitive states, the recovery concept additionally addresses the restoration of resources, such as energy, self-efficacy, or the feeling of control (Sonnentag & Fritz, 2007). Therefore, the recovery concept goes beyond the short term cognitive and emotional effects addressed by escapism and mood management theory and can serve as a theoretical basis to approach long-term effects of media exposure on fatigue, well-being, and psychological as well as physical health status.

In the following section, the potential of video and computer games to contribute to the recovery process and to evoke the four facets of recovery experience outline above will be discussed.

The Recovery Potential of Video and Computer Games

Games and psychological detachment. Mental disengagement is a key component of recovery. Their high degree of interactivity makes games a promising activity for psychological detachment. In contrast to other entertainment media (e.g. television) video and computer games demand active participation of their users (Grodal, 2000). The gaming experience is characterized by a "continuous exchange between players and the game software" (Klimmt & Hartmann, 2006, p. 137), and each player input is followed by an immediate reaction, generated by the gaming software. Video and computer games typically consist of a high number of such "input-output-loops" (Klimmt & Hartmann, 2006, p. 137). Accordingly, the task structure of video and computer games forces the users to focus their full attention on the game. This makes video and computer games a highly immersive media environment (Tamborini & Skalski, 2006; Vorderer, Hartmann, & Klimmt, 2006) with a high "intervention potential" (Bryant & Davies, 2006, p. 185). Accordingly, video and computer games demand the full cognitive capacity of an individual and do not leave much room for thoughts that are not directed to the gaming environment. Furthermore, the use of games is often associated with a strong experience of spatial presence (Ravaja et al., 2004; Ravaja & Saari, 2004; Tamborini & Skalski, 2006), i.e., "the sensation of being physically situated within the spatial environment portrayed by the medium" (Wirth et al., 2007, p. 497). Accordingly, video and computer games can be considered an active form of media entertainment that demands the user's full concentration and at the same time transports the user's thoughts and feelings into the game world. This intense interaction with the gaming environment leaves very little room for other cognitive processes, and games should therefore provide an effective way of escaping negative cognitions or ruminations on stress-inducing events. This potential to foster psychological detachment is further strengthened by game content. Games are often played to take over new roles (Bessière, Seay, & Kiesler, 2007) and to explore fictional worlds (Sherry, Lucas, Greenberg, & Lachlan, 2006; Yee, 2006). Hence, the content and narratives of games provide the opportunity to take a break from everyday life

and to escape stress, problems, and negative affect. In sum, the aforementioned characteristics of games strongly support the assumption that video and computer games can significantly contribute to the recovery process by eliciting psychological detachment.

Games and relaxation. Although playing video and computer games is frequently associated with a rise in psychophysiological arousal (Ballard & Wiest, 1996; Grodal, 2000; Ravaja, Saari, Salminen, Laarni, & Kallinen, 2006; Reinecke & Trepte, 2008), users ascribe a relaxing effect to games (Sherry, Lucas, Greenberg, & Lachlan, 2006; Yee, 2006). Increases in arousal on the one hand, and feelings of relaxation on the other hand, may seem contradictory, but are a common phenomenon that has also been described for other arousing or activating activities, such as sports and physical activities. Relaxing effects of physical activities have been studied extensively during the last decades. Research consistently reveals decreases in state anxiety and tension subsequent to physical activities (Russle et al., 2003; Taylor, Sallis, & Needle, 1985; Thayer, Newman, & McClain, 1994). This relaxing effect of physical activities has been attributed to distraction from stress or anxiety-inducing stimuli (Russle et al., 2003; Taylor, Sallis, & Needle, 1985). Following this rationale, the relaxing effect of video and computer games can be considered a consequence or by-product of their potential to foster psychological detachment. As discussed above, games have a high potential to focus the player's attention on the game and to create a high degree of immersion. Research on non-interactive entertaining media has demonstrated that media message with a high ability to absorb respondents effectively reduce heightened levels of arousal and facilitate unwinding by stopping negative cognitions and ruminations (Zillmann, 1991). Accordingly, as video and computer games are a very absorbing media environment, they are likely to foster feelings of relaxation and to support recovery from stress and strain.

Games and control. In contrast to non-interactive media, users of video and computer games have the ability to control the progress of events in the game (Grodal, 2000; Klimmt & Hartmann, 2006). Unlike other entertaining media, such as movies, which have a

predetermined plot and ending, in video and computer games the protagonist's fate lies solely in the hands of the player (Klimmt, Rizzo, Vorderer, Koch, & Fischer, 2009). The progress of the game largely depends on the player's decisions. The player manipulates the game environment, and all user actions result in immediate feedback from the gaming software. Consequently, the experience of effectance, the feeling to have an effect on the game environment, is an integral part of the gaming experience (Klimmt & Hartmann, 2006; Klimmt, Hartmann, & Frey, 2007). Players can experience the consequence of their decisions and actions without delay and take over the role of causal agents within the game environment (Klimmt & Hartmann, 2006). Furthermore, apart from user actions during gameplay, many games provide additional opportunities to exert control, e.g. by choosing or creating an avatar or choosing among different mission or quests. In sum, video and computer games assign an active role to the player and offer extensive opportunities to exert control over the gaming environment. They provide a feeling of autonomy (Ryan, Rigby, & Przybylski, 2006) and can therefore be expected to contribute to the recovery process by fostering feelings of control during leisure time.

Games and mastery. Video and computer games provide a context for personal accomplishments. Challenge and competition are key aspects of the gaming experience (Hartmann & Klimmt, 2006; Klimmt, Hartmann, & Frey, 2007; Sherry, Lucas, Greenberg, & Lachlan, 2006; Vorderer, Hartmann, & Klimmt, 2006). In most games, players are either confronted with opponents they have to compete with or with problems and riddles they have to solve. As the progress of the game depends on the players' actions, all successes are directly attributable to the players' skills. Furthermore, most games provide precise feedback on the players' performance in form of high-scores or status reports on the players' avatar (e.g. energy level). While successfully proceeding through the game, players are confronted with a series of local achievements (Grodal, 2000) which leads to a feeling of mastery of the game (Klimmt & Hartmann, 2006). To foster feelings of mastery, the level of difficulty is

usually raised gradually over the course of the game (Sherry, 2004). This way, players are confronted with optimal levels of challenge throughout the game. Increasing performance and the rewarding experience of coping with the growing demands of the game contribute to a feeling of mastery and competence (Grodal, 2000; Klimmt, Hartmann, & Frey, 2007; Ryan, Rigby, & Przybylski, 2006). Consequently, video and computer games provide ample opportunities for mastery experiences and thus are likely to facilitate recover.

As illustrated above, playing video and computer games could to contribute to all four facets of recovery experience identified by Sonnentag and Fritz (2007) and might therefore facilitate the recovery process. Players are likely to use games with the intention of recovering from exhausting situations, stress, and strain. Moreover, the motivation to use games for recovery should depend on the strength of the recovery experience associated with game play. Players who have a strong recover experience when playing games will show a higher disposition to use games for recovery than players who experience less recovery when playing games. This expectation is expressed in the first hypothesis:

H1: The subjective recovery experience associated with gameplay is positively related to the use of video and computer games for recovery from stress and strain.

Individuals differ substantially in their level of chronic work-related fatigue (van Veldhoven & Broersen, 2003). A high degree of workload and unfavorable job characteristics are predictors of work-related fatigue (Sluiter, van der Beek, & Frings-Dresen, 1999; Sonnentag & Zijlstra, 2006; van Veldhoven & Broersen, 2003). Work-related fatigue is negatively related to well-being (Sonnentag & Zijlstra, 2006) and is a significant predictor of health complaints (Sluiter, de Croon, Meijman, & Frings-Dresen, 2003). As high job strain leads to stronger strain reactions such as rumination about work-related issues and reduced feelings of control during leisure time (Cropley & Millward Purvis, 2003), individuals who suffer from high levels of work-related fatigue can be expected to have a stronger motivation to engage in recovery-related activities during leisure time. Hence, hypothesis two predicts

that the recovery function of games will be more relevant to people with a higher level of work-related fatigue:

H2: Work-related fatigue is positively related to the use of games for recovery from stress and strain.

Job related strain and fatigue are not the only sources of stress. Daily hassles, i.e., "the irritating, frustrating, distressing demands that to some degree characterize everyday transactions with the environment" (Kanner, Coyne, Schaefer, & Lazarus, 1981, p. 3), are another significant contributor to an individual's stress level. Daily hassles can take many different forms, including interpersonal events such as arguments with friends or family, as well as annoying practical problems such as losing things or financial concerns. Daily hassles are related to negative affect, health impairments, and psychological distress (Chamberlain & Zika, 1990; DeLongis, Folkman, & Lazarus, 1988; Lu, 1991; Serido, Almeida, & Wethington, 2004). While the early stress research was primarily focused on major life events such as divorces, accidents or serious illness as sources of stress (Kanner, Coyne, Schaefer, & Lazarus, 1981), daily hassles are considered an independent and significant source of individual stress in contemporary stress research (Chamberlain & Zika, 1990; Serido, Almeida, & Wethington, 2004). Similar to work-related fatigue, daily hassles may also enhance the relevance of recovery for the individual. Consequently, the recovery function of video and computer games can be assumed to be more attractive to persons with high exposure to daily hassles:

H3: Exposure to daily hassles is positively related to the use of games for recovery from stress and strain.

Apart from the differences in individual stress levels, research on stress and recovery has revealed individual differences in how people approach problems and stressors: People apply different strategies and have access to different resources to react to problems and stress-evoking situations, which in turn affects the course and outcome of the recovery

processes. In the next sections, the consequences of individual differences in coping style and coping resources for the use of games for recovery purposes will be discussed.

Coping Style and the Use of Computer Games for Recovery

Coping can be defined as "constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person" (Lazarus & Folkman, 1984, p. 141). Accordingly, coping refers to actions and strategies applied by an individual to react to stress and problem situations. Although the coping and recovery concepts certainly show some interrelations, both concepts are not identical. While coping refers to the dealing with a specific stressor, recovery goes beyond this and addresses the way individuals restore their internal resources (Sonnentag & Fritz, 2007). Accordingly, recovery refers to activities that allow individuals to regain consumed energy after work, stress, and strain, while coping primarily describes the individual's direct reaction to a given stressor. For the present study, however, a specific aspect of coping theory appears to be promising to foster our understanding of the use of video and computer games as a recovery resource: Coping styles. Coping theories differ in their assumptions about the stability and generality of coping behavior. While some empirical studies asses coping under specific situational conditions, most refer to coping in terms of trait-like, individual coping styles, i.e., an individual's stable preference for certain coping strategies across different situations (Schwarzer & Schwarzer, 1996). Recovery activities can be seen as the manifestation of a person's efforts to cope with stress (Sonnentag & Fritz, 2007). Therefore, a person's coping style might influence the preference for specific recovery activities. Accordingly, the relevance of video and computer games as a recovery resource might depend on a person's coping style. During the last decades, several different theoretical approaches to coping behavior and coping styles have been developed in the field of psychology (Schwarzer & Schwarzer, 1996). Lazarus and Folkman (1984) introduced two different types of coping styles, emotion-focused and problem-focused coping style. These

two factors are still part of most contemporary theories of coping styles (Folkman & Moskowitz, 2004). Emotion-focused coping refers to coping strategies that aim at "regulating emotional responses to the problem" (Lazarus & Folkman, 1984, p. 150), and is primarily directed at reducing emotional distress caused by a problem or stressful situation. Emotion-focused coping encompasses strategies such as avoidance, distancing, or reappraisal of a stressor. In contrast, problem-focused coping refers to strategies oriented towards "managing or altering the problem causing the distress" (Lazarus & Folkman, 1984, p. 150). This cluster of coping strategies includes efforts directed at defining the problem, generating alternative solutions, and choosing among different ways of problem solving.

The individual predisposition for emotion-focused or problem-focused coping style is likely to influence the frequency of the use of video and computer games for recovery. In most instances, playing games does not offer a direct solution to a given problem. Instead, playing video and computer games supports recovery by granting relieve from the negative affect and the psychological distress caused by a problem or stressor, and by building up psychological resources through the experience of mastery and control. Hence, playing games for recovery resembles an emotion-focused, rather than a problem-focused coping strategy. Consequently, individuals with a personal predisposition for emotion-focused coping are more likely to use games for recovery than persons who tend to rely on problem-focused coping. This assumption is expressed in hypothesis four:

H4: Individuals with emotion-focused coping style show a higher tendency to use games for recovery from stress and strain than individuals with problem-focused coping style.

The Moderating Effect of Social Support

Individual reactions to stress are not solely guided by a person's coping style. Recuperation from stress and strain is also influenced by coping resources (Lazarus & Folkman, 1984). The coping process is facilitated by tangible resources as well as skills and competencies. In addition to these individual characteristics, social support has been identified

as one of the most influential coping resources (Lazarus & Folkman, 1984; Schwarzer & Knoll, 2007). Social support refers to "the function and quality of social relationships, such as perceived availability of help, or support actually received" (Schwarzer & Knoll, 2007, p .244). Different types of social support can be identified, e.g., informational (advice), emotional (empathy, reassurance), and instrumental or tangible social support (assistance or money). Social support can facilitate recuperation from stress in several ways. Social support can have a direct beneficial effect on coping (Lazarus & Folkman, 1984). Additionally, it can also function as a buffer that moderates the impact of stress and strain (Schwarzer & Knoll, 2007). Etzion (1984) found a negative correlation between burnout and levels of social support in a study with Israeli managers and human service professionals. In a study on household crowding, Lepore, Evans and Schneider (1991) found higher levels of stress for individuals with low perceived social support. Finally, in a comprehensive literature review of empirical studies dedicated to the relation between social support and well-being, Cohen and Wills (1985) concluded, that evidence exists for both direct and buffering effects of social support. Individuals with deficits in social support are forced to rely on other coping resource when facing work-related fatigue or daily hassles. In this case, video and computer games might serve as an alternative resource that facilitates recovery. This rationale is further supported by research demonstrating the positive social effects of video and computer games. Social interaction is a crucial motivation especially for the use of online games, such as online first person shooter games (Jansz & Tanis, 2007) or massively multiplayer online games (Williams, Yee, & Caplan, 2008). Although negative effects of online games on social interaction, such as decreases in offline face-to-face interaction, are possible (Williams, 2006b), several studies have revealed positive effects of online games on social support. Players of online games use them to maintain existing relationships, meet new people and even to form strong and emotional relationships (Cole & Griffiths, 2007; Williams et al., 2006). Therefore, video and computer games might be considered a source of social support.

This should make games an especially attractive recovery resource for individuals who lack social support from friends and family. Hence, it can be assumed that social support moderates the relation between work-related fatigue and daily hassles and the use of games for recovery purposes. This assumption is expressed in hypotheses five and six:

H5: The correlation between work-related fatigue and playing for recovery from stress and strain will be higher for individuals with low social support.

H6: The correlation between exposure to daily hassles and playing for recovery from stress and strain will be higher for individuals with low social support.

The complete hypothesized model including all of the six above formulated hypotheses is depicted in Figure 1.

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Method

Participants

A total of 1614 persons participated in an online survey. The online questionnaire was accessible to participants from November 28, 2007, to December 31, 2007. Participants were recruited on the websites of popular German gaming magazines (www.pcgames.de, www.pcaction.de, www.4players.de, www.gamona.de, and www.gamigo.de). Completing the questionnaire took about 20 minutes. The sample comprised 1554 men (96.3 percent) and 60 women (3.7 percent). Their ages ranged from 12 - 56 years (*M* = 22.8 yrs.; *SD* = 6.82 yrs).

Measures[1]

General use of video and computer games. Participants were asked to indicate how often they play video or computer games on a five point scale (1 = daily, 2 = several times a week, 3 = once a week, 4 = once per month, and 5 = less than once per month). This item was

later recoded so that higher values indicate higher gaming frequency. Additionally, participants were asked how many minutes their average gaming session lasted. The use of a single-item indicator for the general use of video and computer games raises questions about the reliability of this measure. However, this method seems justified because the measure was not used to test the hypotheses outlined above, but was primarily included to assess the participants' general affinity for video and computer games.

Playing computer games for recovery purposes. Six items were used to measure the frequency of game use after stressful and exhausting situations. Participants were instructed to report the frequency of game use (scale ranging from 1 "never" to 5 "very frequently") in the following situations: "After an exhausting task", "After annoying situations (e.g. after an argument or bad news)", "When you are under stress", "After school/university/work", "When you feel tired", "When you want to recover". The internal consistency of the scale was acceptable (Cronbach's $\alpha = .72$).

Recovery experience associated with game play. The Recovery Experience Questionnaire (Sonnentag & Fritz, 2007) was adopted to measure recovery experience related to game play. The scale contains four sub-scales measuring the different facets of recovery experience: Psychological detachment, relaxation, mastery, and control. Each sub-scale comprises 4 items. Participants were instructed to rate these with regard to their recovery experience when playing games, e.g., "When I play video or computer games I forget about work" (psychological detachment), "When I play video or computer games I use the time to relax" (relaxation), "When I play video or computer games I do things that challenge me" (mastery), or "When I play video or computer games I feel like I can decide for myself what to do" (control), on a five-point scale, ranging from 1 "does not apply at all" to 5 "does fully apply". The four-sub scales showed acceptable internal consistency (Cronbach's alphas: Psychological detachment: $\alpha = .78$, relaxation: $\alpha = .70$, mastery: $\alpha = .76$, control: $\alpha = .77$).

Work-related fatigue. The Need for Recovery Scale (de Croon, Sluiter, & Frings-Dresen, 2006; van Veldhoven & Broersen, 2003) was used to measure participants' chronic level of work-related fatigue. The scale comprised 11 items (e.g., "I find it difficult to relax at the end of a working day" and "By the end of the working day, I feel really worn out") and participants were instructed to rate each item on a 4-point scale from 1 "never" to 4 "always". For school and university students, the items were automatically rephrased to fit their occupational status (e.g. "I find it difficult to relax at the end of a day at school/university."). The scale showed high internal consistency (Cronbach's α = .83).

Daily hassles during the last four weeks. The Daily Stress Inventory (DSI, Brantley, Waggoner, Jones, & Rappaport, 1987) was used to measure participants' exposure to unfavorable and stress-related events. The DSI lists 58 daily hassles (e.g., "Hurried to meet deadline", "Had minor accident (broke something, tore clothing)", and "Heard some bad news"). Participants indicated which of these events they had experienced during the last four weeks and rated the stressfulness of the events on a scale from 1 "occurred but was not stressful" to 7 "caused me to panic". The internal consistency of the scale was high (Cronbach's α = .96). In the present study, the average stressfulness rating (sum of the stressfulness ratings divided by the number of experienced events) was used as an indicator of exposure to daily hassles during the last four weeks.

Coping Style. Four sub-scales (active coping, planning, self-distraction, and denial) of the brief COPE inventory (Carver, 1997) were included in the survey to asses coping style. The "brief COPE" is a short form of the original COPE inventory (Carver, Scheier, & Weintraub, 1989) and assesses different coping styles with two items per sub-scale. These coping styles connect to the coping model by Lazarus and Folkman (1984; see above). The items describe potential reactions to problems or problematic situations, e.g., "I concentrate my efforts on doing something about the situation I'm in" (active coping), or "I turn to work or other activities to turn my mind off things" (self distraction). Participants were instructed to

indicate how often they tend to react in the respective way when facing a problem on a scale from 1 “never” to 4 “frequently”. Not all sub-scales showed high internal consistencies (Cronbach’s alphas: Active coping: $\alpha = .72$, planning: $\alpha = .67$, self-distraction: $\alpha = .57$, denial: $\alpha = .71$), but all were still within range of the reliability indices found in the original study by Carver (1997). Lazarus and Folkmann (1984) differentiate between two general coping styles, problem-focused and emotion-focused coping. Accordingly, the four subscales of the “brief COPE” were combined to form indicators for both general coping styles. As active coping and planning are both coping strategies that aim at problem-solving, they represent forms of problem-focused coping (Carver, Scheier, & Weintraub, 1989), whereas self-distraction and denial are directed at the regulation of cognitions or emotions caused by a stressor and therefore resemble forms of emotion-focused coping. Accordingly, the scores of the active coping and planning subscales were totaled and averaged to form a single index for problem-focused coping (sensu Lazarus & Folkman, 1984), whereas the scores of the self-distraction and the denial subscales were totaled and averaged to form an index of emotion-focused coping (Cronbach’s alphas: Problem-focused coping: $\alpha = .79$, emotion-focused coping: $\alpha = .53$). Taking into account the low internal consistencies of the subscales of the “brief COPE”, the small number of items, and the conceptual broadness of the two coping styles, the low internal consistency of the emotion-focused coping scale is not surprising. However, the low reliability of this measure is a limitation of present study.

Social support. A short-form (Schwarzer, Dunkel-Schetter, & Kemeny, 1994) of the UCLA Social Support Inventory (UCLA-SSI, Dunkel-Schetter, Feinstein, & Call, 1986) was used to assess received social support. The UCLA-SSI asks for three types of social support received: a) Informational support in form of advices, b) tangible support in form of assistance, and c) emotional support in form of reassurance and listening. Participants were instructed to indicate how often they had received these forms of support during the preceding four weeks by a) friends, b) relatives, c) partners, and d) groups or organizations on a scale

from 1 = “never” to 5 “ very frequently”. The scale showed high internal consistencies among all four sources of social support (Cronbach’s alphas: Friends: α = .77, relatives: α = .80, partner: α = .96, groups and organizations: α = .88). For this study, the scores of all four sources of social support were totaled and averaged to form a single indicator for received social support.

Results

Descriptive Statistics

The great majority of participants play video or computer games daily (46.6 percent) or several times a week (48.4 percent) with an average playing time of 117.28 minutes (*SD* = 68.81 min.) per gaming session.

Participants reported to use video and computer games for the purpose of recovery on a regular basis (*M* = 3.32, *SD* = 0.72, scale ranging from 1 = “never” to 5 = “very frequently”), indicating that gaming after exhausting situations and for recovery purposes is a rather common practice for the participants. Furthermore, recovery experience is a significant facet of the participant’s gaming experience. The mean scores of the four sub scales of the (games-related) Recovery Experience Questionnaire were all well above scale midpoint. Hence, the data suggest that all four recovery experiences can be elicited by the use of video and computer games. This supports the above formulated basic theoretical assumptions on the recovery potential of video and computer games. Means and standard deviations of all variables are presented in Table 1.

Due to the small number of women in the sample, it was difficult to draw conclusions on possible gender effects on the statistical relations among the variables considered in this study. However, to test for significant differences in the mean levels of the studied variables, a MANOVA with participants’ sex as fixed factor and all other variables listed in Table 1 as independent variables was computed. To compensate for the inequality of the size of the male and female sub samples, 60 male participants were randomly selected from the main sample

and included in the MANOVA together with the 60 female participants. The MANOVA revealed no significant main effect of sex on any of the tested variables.

Zero-Order Correlations

Before testing the hypothesized model, zero-order correlations among the studied variables were analyzed. As can be seen in Table 1, the four facets of recovery experience (psychological detachment, relaxation, mastery, and control) correlated significantly with the general use of video and computer games as well as the use of games for recovery. The only exception was psychological detachment which did not correlate with general game play. All four recovery facets showed a stronger correlation with the use of games for recovery than for the general use of games. Accordingly, recovery experience associated with game play has a stronger predictive power for the recovery related use of games than for general game playing.

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Work-related fatigue and daily hassles in the previous four weeks correlated significantly positive with use of video and computer games for recovery. In contrast, work-related fatigue was negatively related to general game use, and daily hassles did not show a significant correlation to general game play at all. According to these data, work-related fatigue as well as stress caused by daily hassles was associated with heightened use of games for recovery purposes while general game playing was constricted by work strain.

Participants' coping style was also related to the use of games. Problem-focused coping style showed a small but significant negative correlation to general game play but no significant relation with gaming for recovery purposes. Emotion-focused coping style was

negatively related to general gaming and positively related to gaming for recovery purposes. Finally, social support was not related to the frequency of general game use but correlated positively with playing games for recovery.

Testing the Hypothesized Model

Hypotheses one to four were tested with a structural equation model computed with AMOS 7.0 (Arbuckle, 2006). All variables, except daily hassles, were modeled as latent variables. The four latent dimensions of recovery experience were each estimated based on the four items of the respective sub-scales of the Recovery Experience Questionnaire. These four latent constructs were then used to estimate the second-order factor 'recovery experience'. The 11 items of the Need for Recovery Scale were used to estimate the latent construct of work-related fatigue. The mean scores of the active coping and planning sub-scales of the brief COPE inventory were used to estimate problem-focused coping style while emotion-focused coping style was estimated from the mean scores of the self-distraction and denial sub-scales. The latent construct of playing games for recovery was estimated from the six items listed in the measures section. Daily hassles were measured with a single indicator (sum of stressfulness ratings divided by number of experienced events, cf. measures section) and thus were entered into the model as an observed variable.

For reasons of parsimony, the measurement models are not presented in the graphical representation of the model (Figure 2). Instead, only the factor loadings of the four facets of recovery experience on the second-order recovery experience construct are visualized. The measurement models led to a satisfactory description of the latent constructs.

The relationships between the studied variables outlined in hypotheses one to four were all tested in the model. Two indicators were used to assess the fit of the predicted model, the χ^2 test and the root mean square error of approximation (RMSEA). The model fit the data well, $\chi^2(656) = 2903.55$, $p < .001$, RMSEA = .046. Although the significant χ^2 value indicates suboptimal model fit, this is most likely an effect of the large sample size of the present study.

As Byrne (2001) notes, the χ^2 test tends to underestimate model fit for larger samples significantly. In contrast to the χ^2 statistic, the RMSEA value of the tested model indicated good fit. According to MacCallum, Brown, and Sugawara (1996), RMSEA values below .05 indicate close model fit. Thus, with an RMSEA value of .046, the presented model can be considered fitting the data well.

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pls. insert Figure 2 about here

Figure 2 presents the standardized beta coefficients representing all statistical relationships outlined in hypotheses one to four. As predicted in hypothesis one, recovery experience associated with game play showed a strong positive relation to the use of games for recovery ($\beta = .60$, $p < .001$). The stronger the recovery experience that an individual gains through the use of games, the more often games are played after exhausting situations and strain. Hypotheses two and three predicted that work-related fatigue and exposure to daily hassles during the previous four weeks are both positively related to playing games for recovery. Both assumptions were supported by the data. Work-related fatigue ($\beta = .18$, $p < .001$) as well as daily hassles ($\beta = .09$, $p < .001$) were both significantly and positively related to the use of games for recovery purposes. Accordingly, the recovery function of video and computer games is more attractive for individuals who are confronted with more work-related strain and daily hassles. Hypothesis four predicted that individuals with emotion-focused coping style have a higher tendency to use games for recovery purposes than individuals with problem-focused coping style. Hypothesis four was supported by the model, emotion-focused coping style was stronger related to playing for recovery ($\beta = .51$, $p < .001$) than problem-

focused coping style ($\beta = .22$, $p < .001$). Furthermore, emotion-focused and problem-focused coping style were significantly negatively correlated ($r = -.63$, $p < .001$). To further investigate hypothesis four, participants were categorized into four coping style groups (high vs. low emotion focused coping x high vs. low problem-focused coping style) via median splits. An ANOVA with coping style group as fixed factor and the use of games for recovery as independent variable revealed a significant main effect of coping style on playing for recovery ($F(3, 1610) = 24.19$, $p < .001$, partial $\eta^2 = .043$). According to Scheffé post hoc tests, participants scoring high on emotion-focused and low on problem-focused coping style ($M = 3.50$) as well as participants scoring high on emotion-focused and high on problem-focused coping style ($M = 3.49$) played video and computer games for recovery significantly more frequently than participants scoring low on emotion-focused and low on problem-focused coping style ($M = 3.18$) and participants scoring low on emotion-focused and high on problem focused coping style ($M = 3.21$), $p < .05$. Taken together, these results support hypothesis four and demonstrate that individuals with emotion-focused coping style show a higher tendency to use games for recovery than individuals with problem-focused coping style.

In sum, the predictors formulated in hypotheses one to four explained more than 50 percent of the variance of the use of games for recovery purposes in the structural equation model (squared multiple correlations = .564).

The Moderating Effect of Social Support

Hypotheses five and six predicted that the relation between the use of games for recovery, work-related fatigue and daily hassles respectively, would be stronger for individuals with low social support. The AMOS 7.0 multigroup analysis was used to test whether the model depicted in Figure 2 differs for participants with high vs. low social support. Here, the main sample was separated into two sub-samples with high ($n = 839$) vs. low ($n = 775$) social support via a median split. The unconstrained two-group model fit the data well, $\chi^2(1312) = 3597.37$, $p < .001$, RMSEA = .033. As predicted in hypothesis five, the

path between work-related fatigue and playing for recovery was stronger for participants with low social support ($\beta = .25$, $p < .001$) than for participants with high social support ($\beta = .11$, $p < .01$). In case of daily hassles, the path to playing for recovery was significant and positive for participants with low social support ($\beta = .13$, $p < .001$) but fell below significance for participants with high social support ($\beta = .05$, n.s.). The differences in path strength found for participants with high vs. low social support followed the predictions of hypotheses five and six. The recovery function of video and computer games when facing work-related or private challenges is more important for individuals with low social support than for individuals with high social support. However, the dichotomization of a continuous moderator variable results in a loss of information and lowers the statistical power for the detection of moderation (J. Cohen, Cohen, West, & Aiken, 2003, p. 256). Multiple regression analysis is therefore preferable for the investigation of moderator effects (J. Cohen, Cohen, West, & Aiken, 2003; Frazier, Barron, & Tix, 2004). To reduce problems with multicollinearity, the independent variables work-related fatigue and exposure to daily hassles, as well as the moderator variable social support were standardized using a z-transformation as suggested by Frazier, Baron, and Tix (2004). Afterwards, two product terms of the independent variables and the moderator were derived by multiplying the standardized scores of work-related fatigue and of daily hassles with the standardized score of social support. To test for the moderation effect of social support on the relation between work-related fatigue and the use of games for recovery, a hierarchical multiple regression was computed with the standardized scores of work-related fatigue and social support entered in the first step and the product term of the two variables entered in the second step. Results are presented in Table 2. The product-term of work-related fatigue and social support was a significant predictor of playing for recovery ($\beta = -.054$, $p < .05$) and led to a small but significant increase in explained variance ($\Delta R^2 = .003$, $p < .05$) which indicates a significant moderation effect of social support. Hence, hypothesis five was supported. A second hierarchical multiple regression was computed with daily hassles, social

support and the product term of the two variables to test hypothesis six. Results are also shown in Table 2. The product term of daily hassles and social support was not a significant predictor of playing for recovery (β = -.024, n.s.), and did not lead to a significant increase in explained variance (ΔR^2 = .001, n.s.). Although the path coefficients found in the two-group SEM presented above suggest a moderation effect of social support on the relation between daily hassles and playing for recovery, this was not confirmed by the multiple regression analysis.

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Discussion

The results of the present study demonstrate that video and computer games have a significant recovery potential and are frequently used after stress and strain and for recovery reasons. Therefore, this study reveals an important effect of video and computer games that has not been addressed systematically in previous research.

As predicted, recovery experience turned out to be a significant facet of the gaming experience. The data revealed that the four recovery facets, psychological detachment, relaxation, mastery, and control, are all elicited by video and computer games. The results also suggest that games are frequently used for recovery purposes. Participants reportedly use video and computer games after exhausting or frustrating situations and for recovery reasons on a regular basis.

Additionally, as predicted in hypothesis one, the recovery experience attained by the use of video and computer games was a significant predictor of the use of games for recovery. Participants who generally associate strong recovery experiences with game play reported to

used games more often after stress and strain than participants who reported lower recovery experiences when playing games.

Furthermore, as predicted in hypotheses two and three, work-related fatigue, as well as exposure to daily hassles during the last four weeks both were significant predictors of the use of games for recovery. Individuals who suffered from more work-related strain and leisure time stress showed a higher tendency to use games for recovery than participants with lower stress levels. In contrast to the use of games for recovery, the general use of video and computer games was negatively correlated to work-related fatigue. Hence, the general frequency of game play is impaired by stress and strain whereas the specific use of games for recovery purposes increases with heightened stress-levels. This illustrates that individuals adapt their personal use of video and computer games to their individual circumstances. The self-reports of the participants suggest that games are used as a means of self-regulation, and that their recovery potential is used to react to work stress and daily hassles.

It is important to note, that the participants in this study showed only moderate levels of work-related fatigue ($M = 1.96$, scale ranging from 1 “never” to 4 “always”) and reported only moderate exposure to daily hassles ($M = 2.60$, scale ranging from 1 “occurred but was not stressful” to 7 “caused me to panic”). Samples of participants with higher levels of stress might make even more use of the recovery potential of video and computer games, and might therefore show an even stronger relationship between work-related fatigue, daily hassles, and the use of games for recovery. However, in case of individuals with extremely high stress levels, the opposite may be true. It is well possible that individuals who are confronted with many sources of stress might not have the necessary capacities to engage in recreational activities, such as playing video and computer games. In this case, video and computer games might not be an available option for recovery. Future studies should therefore investigate the role of games as sources of recovery in population with different stress levels.

In addition to the overall amount of stress, the participants' coping style was also identified as a significant predictor of the use of games for recovery. As predicted in hypothesis four, participants with emotion-focused coping style showed a higher tendency to play games for recovery than individuals who tend to react with problem-focused coping efforts when facing a stressor. Accordingly, the results demonstrated that the recovery function of video and computer games seems to be more appealing for individuals who have a general tendency for emotion-focused coping. Research on the risks and benefits of emotion-focused vs. problem-focused coping has shown mixed results. Many researchers come to the conclusion that emotion-focused coping is associated with higher levels of distress, because it does not provide a way to address the source of stress (Folkman & Moskowitz, 2004). However, emotion-focused coping is not necessarily inferior to problem-focused coping. Rather, both forms of coping can facilitate and impede each other (Lazarus & Folkman, 1984). While emotion-focused coping may not offer a direct solution to a stress-evoking problem, it may still facilitate problem-focused coping by reducing the emotional tension caused by a stressor and thus increasing an individual's capacity to engage in problem-solving. Playing games for recovery might also have negative long-term effects, if frequent players would show a general preference for emotion-focused coping and would chronically abstain from problem-focused coping behavior. In this case, playing games for recovery might eventually lead to increased levels of stress if no attempts to solve the stress-evoking problems are made.

Hypotheses five and six addressed the role of social support as a potential moderator between stress and the use of games for recovery. In the present study, social support correlated positively with playing games for recovery. This might suggest that video and computer games are indeed used as a source of social support in stressful and demanding situations. However, as the direct contribution of games to social support was not measured in this study, this interpretation is preliminary and has to be validated in future studies. As

predicted in hypothesis five, the data revealed a moderating effect of social support on the relationship between work-related fatigue and playing games for recovery purposes. Individuals with lower levels of social support showed a higher tendency to use video and computer games for recovery when facing work-related stress. Although significant, this moderator effect explained only 0.3 % percent of the variance of playing games for recovery. However, as mentioned by Chaplin (1991), moderator effects in psychological research are often small but nevertheless have theoretical implications. Although the increase in explained variance associated with the moderating role of social support was very low in this study, future studies should further investigate the potential role of social support as a moderator between stress and strain and the use of entertaining media. Taking into account the low mean level of work-related fatigue (M = 1.96) and the substantial level of social support (M = 2.78) in this sample, other samples facing more work strain and less social support might show stronger moderator effects. As discussed above, social support is an important coping resource. The data gathered in the present study might hint at the possibility that individuals with lower levels of social support may use video and computer games for recovery to compensate for this deficit. However, taking into account the small amount of explained variance found in the present study, this effect has to be further investigated in future studies.

A moderating effect of social support on the relation between daily hassles and the use of games for recovery was not found in the present study. This is in line with data gathered in a study by Etzion (1984) who found a moderating effect of social support for the relations between work-related stress and burnout but not for life stress and burnout. According to Etzion, this differential effect of social support may be explained by communication patterns. While job-stress is widely accepted as a common experience that can legitimately be shared with others, stress induced by daily hassles occurring in an individual's private life is less likely to be discussed. Because communication with the social environment is an important

precondition for positive effects of social support (Etzion, 1984), life stress and daily hassles are less likely to be buffered by social support than work related stress.

Some limitations of the present study have to be considered in the interpretation of the results. All measures used in this study are based on cross-sectional self-report data. This brings about several methodological disadvantages. Recovery is a dynamic process. Successful recovery through the use of video and computer games may have caused lower chronic levels of stress and strain within the sample. With cross-sectional data, however, the dynamic interplay of the use of games and the day-level of stress and strain cannot be assessed. Therefore, it is possible that the recovery potential of games has been systematically underestimated in this study. It is also possible, however, that the use of self-report measures for both recovery experience associated with gameplay as well as the use of games for recovery made it easy for participants to infer the intention of the study which may have influenced the responses. To avoid these potential shortcomings and to validate the results of the present study, future studies should apply experimental or longitudinal designs or assess diary data to investigate the recovery effects of entertaining media.

The sample structure is a further limitation of the present study. As participants were recruited via websites of gaming magazines, the study is not based on a representative sample of the population of video and computer game users. The sample comprised a high number of frequent players, whereas casual gamers with lower gaming affinity were underrepresented. Furthermore, very few female players participated in the survey. None of the variables considered in this study showed significant differences for men and women. However, given the well-documented gender differences in video and computer game use and habits (e.g. Lucas & Sherry, 2004), gender comparisons of the recovery function of games remains a task for future studies. Furthermore, future studies will also have to investigate and compare the recovery effects of different game genres.

As reported in the method section, the internal consistency of the emotion-focused coping measure used in this study was low. Accordingly, the reliability of the scale is restricted. Consequently, the correlation between emotion-focused coping and the use of games to recover from stress and strain has to be validated in future studies.

In contrast to the measure of emotion-focused coping, the DSI (Brantley, Waggoner, Jones, & Rappaport, 1987) which was used to assess the participants' exposure to daily hassles during the last four weeks showed a very high internal consistency (Cronbach's α = .96). This indicates that although this scale asks for a very wide range of negative events, participants showed a generally strong tendency to give most of these items either a high or a low rating. This might suggest that instead of measuring state exposure to daily hassles, this scale might rather assess a trait characteristic, such as trait responsiveness to stressful events or neuroticism. Again, future studies could compensate for this limitation, for example by gathering diary data on the exposure to stress.

Video and computer games are by far not the only effective recovery activity. A wide range of leisure activities, such as sports and social activities, have been identified as effective sources of recovery (Rook & Zijlstra, 2006; Sonnentag & Zijlstra, 2006). It was not the purpose of this paper, however, to compare the recovery potential of video and computer games to the recovery effects of other recreational activities. Therefore, it remains unclear whether games are more or less suitable for recovery than other activities. Depending on the frequency and intensity of game use, video and computer games could even have a negative effect on the recovery process. It could be argued that time spent playing video and computer games decreases the time that is available for other recreational activities, such as sports (Andersen, Crespo, Bartlett, Cheskin, & Pratt, 1998; Berkey, Rockett, Gillman, & Colditz, 2003). Consequently, excessive game play may interfere with other recreational activities and hence have a negative influence on recovery. Furthermore, video and computer games demand full attention and high concentration from the player. Consequently, after long

gaming sessions, the resources consumed during the game might exceed the recovery effect of the gaming experience. Hence, instead of facilitating recovery, prolonged game play may have the opposite effect and may even increase exhaustion. Especially for individuals suffering from video or computer game addiction (Griffiths, 2007), excessive game use is likely to be an additional source of stress rather than a recreational activity. Video and computer game addiction is accompanied by conflicts within private life and the working domain and negatively affects psychological well being (Griffiths, 2007; Lemmens, Valkenburg, & Peter, 2009). These potential negative effects of high gaming frequency and intensity on recovery as well as the interplay of video and computer games and other recreational activities have to be investigated in future studies.

Despite the abovementioned limitations, this study demonstrates the usefulness of the recovery concept for entertainment research in general and video and computer games research in particular. As discussed above, several different approaches, such as mood management theory (Zillmann, 1988a; Zillmann, 1988b) or research on escapism through media exposure (Henning & Vorderer, 2001; Kubey & Csikszentmihalyi, 1990) are directed at the self-regulating functions of media use. The recovery concept may provide a conceptual framework which has the potential to interconnect these existing approaches and to widen the perspective for potential positive effects of entertaining media one well-being and physical health. Future studies will have to address the question whether other, non-interactive media have the same recovery potential as video and computer games. All in all, the recovery concept is a promising theoretical approach, its integration into media use and effects studies may provide new insights into the self-regulating function of entertaining media and might proof useful in generating innovative conceptual developments in entertainment theory.

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Notes

1. The survey was administered in German. All example items or questions presented in the measures section were either taken from the original English versions of the respective scales or were translated by the author if no English version exists (e.g. use of games for recovery).

Table 1: Means, Standard Deviations, and Zero-Order Correlations among Study Variables

Variable	*M*	*SD*	*Min*	*Max*	1	2	3	4	5	6	7	8	9	10
1. General frequency of game use	4.40	0.62	1.00	5.00	-									
2. Playing games for recovery	3.32	0.72	1.00	5.00	.30**	-								
3. Recovery experience:	4.08	0.81	1.00	5.00	.02	.26**	-							
Psychological Detachment														
4. Recovery experience:	3.99	0.68	1.00	5.00	.11**	.36**	.32**	-						
Relaxation														
5. Recovery experience: Mastery	3.48	0.79	1.00	5.00	.18**	.23**	.06*	.31**	-					
6. Recovery experience: Control	4.01	0.77	1.00	5.00	.15**	.31**	.28**	.35**	.40**	-				
7. Work-related fatigue	1.96	0.47	1.00	3.73	-.07**	.18**	.14**	.01	-.07**	-.03	-			
8. Daily hassles	2.60	0.91	1.00	7.00	.02	.17**	.00	-.01	.06*	.04	.28**	-		
9. Problem-focused coping	3.01	0.59	1.00	4.00	-.09**	-.04	.01	.13**	.13**	.05*	-.08**	-.15**	-	
10. Emotion-focused coping	1.83	0.47	1.00	4.00	-.05*	.24**	.10**	.07**	.06*	.07*	.16**	.26**	-.30**	-
11. Social support	2.78	0.66	1.00	4.69	-.04	.07**	-.02	.11**	.18**	.00	-.07**	-.08**	.25**	-.02

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

Table 2: Test of Moderator Effect of Social Support Using Hierarchical Regression

Step and Variable	*B*	*SE B*	*β*	*ΔR²*
Step 1				
Work-related fatigue	.133	.018	.184**	
Social support	.060	.018	.082**	.039**
Step 2				
Work-related fatigue x social support	-.040	.028	-.054	.003*
Step 1				
Daily hassles last 4 weeks	.127	.018	.176**	
Social support	.061	.018	.084**	.036**
Step 2				
Daily hassles last 4 weeks x social support	-.015	.017	-.021	> .001

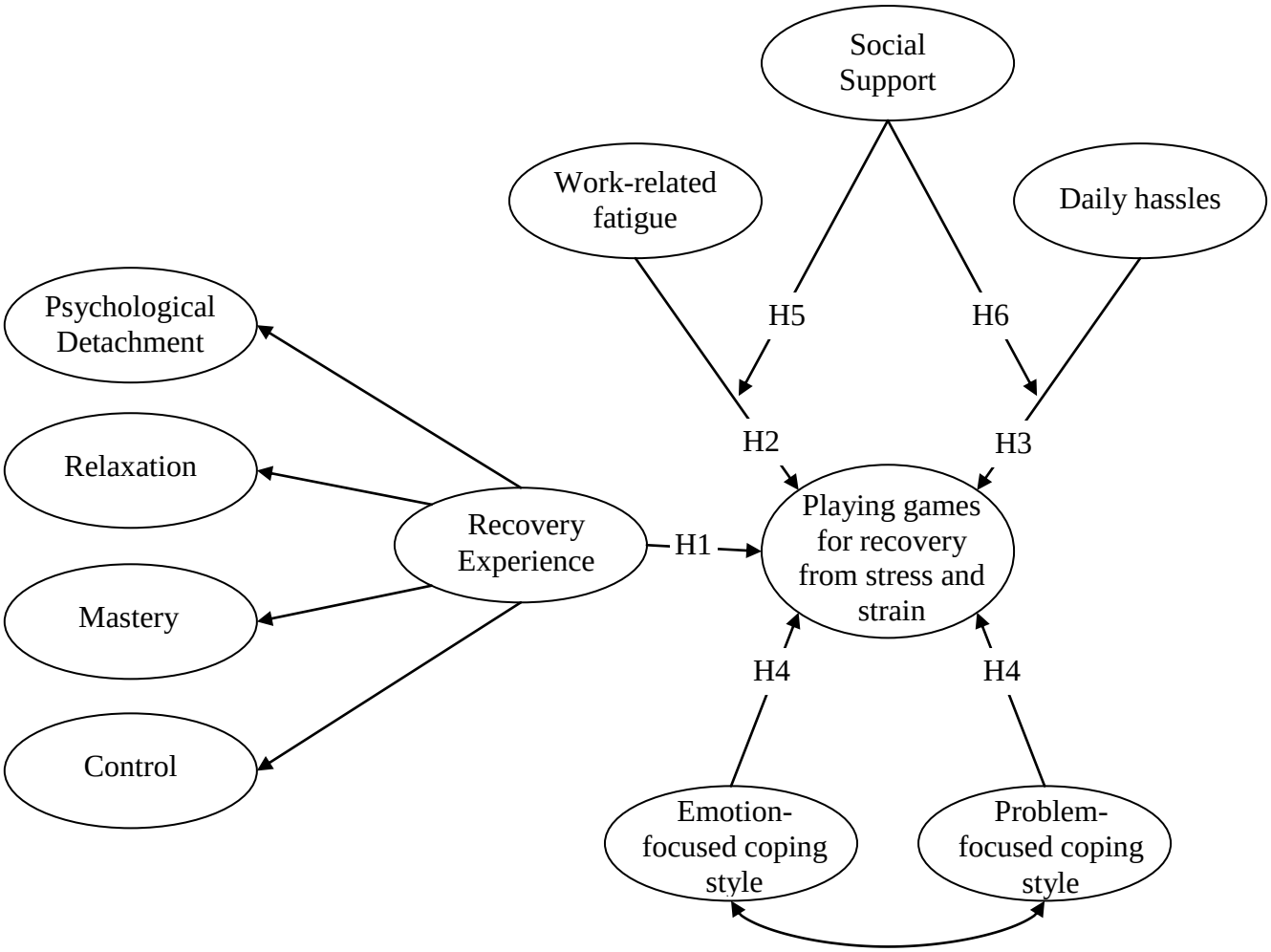
Note. Dependent variable: playing games for recovery from stress and strain.

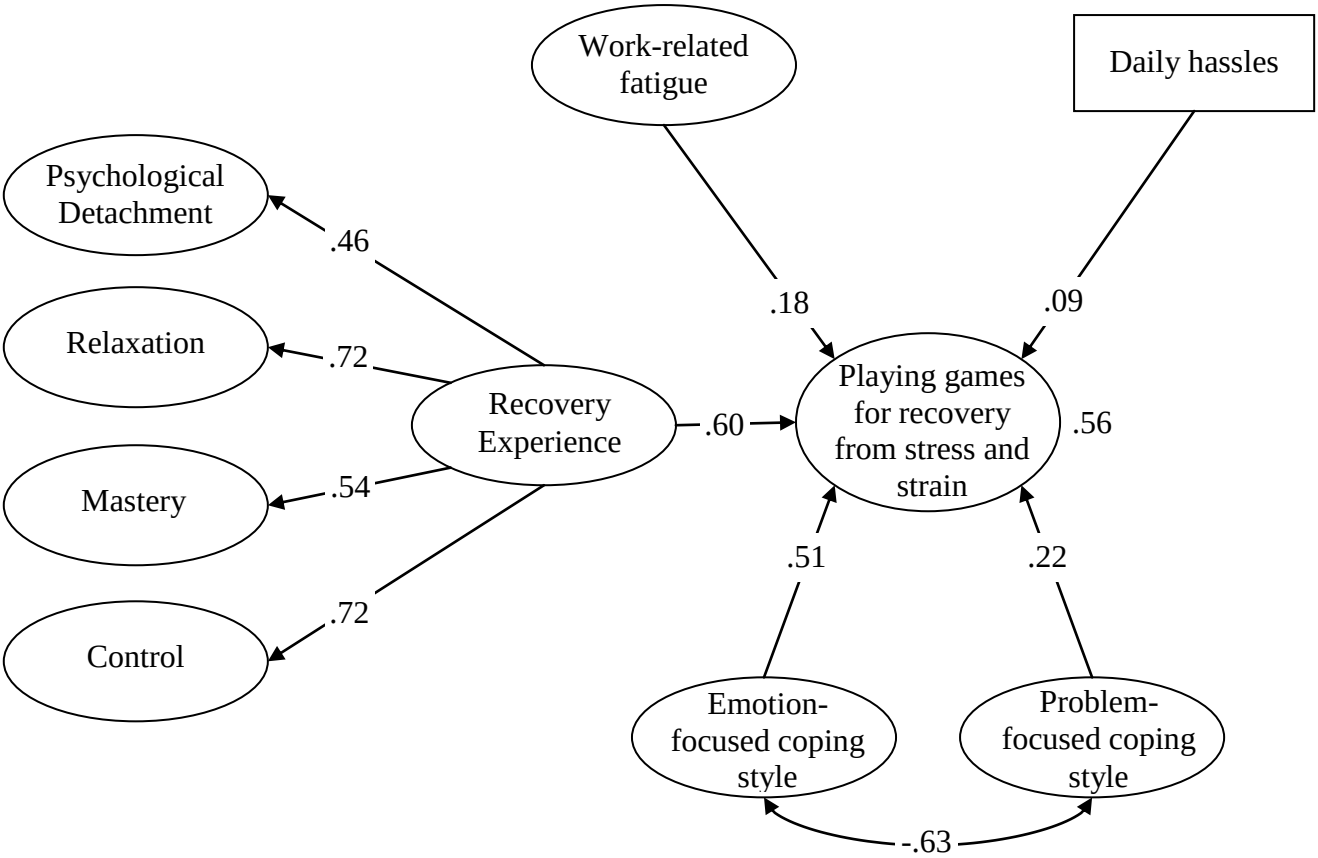
** $p < .01$ * $p < .05$

Figure Captions

Figure 1. The hypothesized model on the relationship among recovery experience, work-related fatigue, daily hassles, emotion-focused coping, problem-focused, and playing games for recovery from stress and strain, with social support acting as moderator.

Figure 2. Structural equation model of the relationship among recovery experience, work-related fatigue, daily hassles, emotion-focused coping, problem-focused coping, and playing games for recovery from stress and strain. Ellipses represent latent constructs estimated form at least two indicators, rectangles represent observed variables. Coefficients at single-headed arrows represent standardized betas or factor loadings, the coefficient at the double-headed-arrow between emotion-based and problem-based coping represents a correlation coefficient. The path between problem-focused coping and playing games for recovery is significant at $p < .05$; all other coefficients are significant at $p < .001$.


Social Support
Work-related fatigue
Daily hassles
H5
H6
Psychological Detachment
Relaxation
Mastery
Control
Recovery Experience
H1
H2
H3
Playing games for recovery from stress and strain
H4
H4
Emotion-focused coping style
Problem-focused coping style


Work-related fatigue
Daily hassles
Psychological Detachment
Relaxation
Mastery
Control
.46
.72
.54
.72
Recovery Experience
.60
.18
.09
Playing games for recovery from stress and strain
.56
.51
.22
Emotion-focused coping style
Problem-focused coping style
-.63