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Playing with power: Power poses affect enjoyment, presence, controller responsiveness, and arousal when playing natural motion-controlled video games

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ABSTRACT

Though playing with natural versus traditional game controllers affects game experiences, studies have not investigated how power poses affect the experience of playing natural controlled video games. Participants keeping powerful poses experienced increased enjoyment, presence, and controller responsiveness compared with those holding powerless poses. Congruent with self-perception and automatic activation models, mediation analyses uncovered direct effects of power poses and also indirect effects in which power poses increased power feelings, which in turn were associated with higher enjoyment, presence, and controller responsiveness but reduced arousal. This provides initial evidence for how physical poses affect people's experiences with natural game interfaces, and highlight basic self-perception and automatic activation mechanisms behind the effect.

The use of video game controllers that use the natural mapping of body movements can substantially change people's perceptions about the outcomes of a virtual game experience. Natural mapping refers to how closely virtual actions in a game match the users' real physical actions that triggered such game actions (Skalski, Tamborini, Shelton, Buncher, & Lindmark, 2011). For example, people can play games with steering wheel controllers, may swing a controller to play virtual tennis, or play games with plastic guitars and drums as controllers (McGloin, Farrar, & Krcmar, 2011).

In this context, participants report higher perceived controller naturalness when playing a tennis video game with a natural (e.g., Nintendo Wii) instead of a traditional button and joystick controller, and perceived controller naturalness is positively associated with perceived realism of the game's graphics and sound, along with increased presence or feelings of immersion in the game environment (McGloin et al., 2011). When using natural game controllers, increased presence is also positively linked to game enjoyment (McGloin et al., 2011; Skalski et al., 2011). Controller naturalness also amplifies the effects of virtual experiences. Among participants playing a boxing game using boxing glove controllers or traditional button and joystick motion controllers, higher perceived controller naturalness augments game realism and immersion, and greater game immersion boosts the accessibility of aggressive cognitions (McGloin, Farrar, & Krcmar, 2013). Along these lines, playing with controllers resembling firearms increases game realism and aggressive cognitions (McGloin, Farrar, & Fishlock, 2015). One exception is that people may prefer playing first person shooter games with traditional button and joystick controllers instead of natural motion controllers (Limperos, Schmierbach, Kegerise, & Dardis, 2011; Rogers, Bowman, & Oliver, 2015).

Most studies on motion-controlled video games embrace a media effects perspective by assuming that natural mapping will impact basic virtual experiences. In particular, researchers assume that natural game controllers reduce the gap between real-life models of behavior (e.g., punching, steering to drive a car) and triggering actions in the game environment compared with traditional controllers, and thus natural controllers enhance the effect of game experiences (McGloin et al., 2011). As such, natural mapping is theorized as a technological determinant of presence in video games because such controller actions correspond with mental models people have already formed for real-world activities (Boyan

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& Sherry, 2011; Skalski et al., 2011).

Although such an approach greatly illuminates how people experience virtual game situations as a result of controller type (e.g., natural vs. traditional), there has been less attention to how human factors, such as people's pose (e.g., expansive and relaxed, slumped and constrained) and position (e.g., standing, sitting), along with current emotional state (e.g., feeling more powerful or powerless) influence how people experience virtual game situations when using natural controllers. Consider recent research highlighting how humans and other animals express power through open, expansive poses, and powerlessness through closed, constricted poses, and how such poses influence feelings of power, physiological stress, and risk tolerance (Carney, Cuddy, & Yap, 2010; Ranehill et al., 2015). Though power poses have been implemented in the design of video games targeting math anxiety among women (Isbister, Karlesky, Frye, & Rao, 2012), the effects of power poses on basic game experiences such as enjoyment, presence, controller responsiveness, and arousal have not yet been tested. Additionally, the underlying mechanism explaining the possible effect of power poses on the experience of playing motion-controlled video games has not been specified. For example, power poses may influence enjoyment, presence, controller responsiveness, and arousal indirectly by augmenting perceptions of one's own power and sense of control, or power poses may directly influence basic game experiences with no involvement of power feelings and self-perception (Strack, Martin, & Stepper, 1988). Considering this, we examine how power poses affect basic gaming experiences when playing a natural motion-controlled game. By doing so, we complement affordance-centric studies by examining how people's physical pose (e.g., powerful pose or playing while opening one's limbs and expanding the body, or powerless pose or playing while closing one's limbs and contracting the body) and position (e.g., standing, sitting) influences key game experiences when playing the same motion-controlled video game. By keeping controller type and game task as constants, this study is more capable of examining how power poses and power feelings color participants' game experiences (e.g., enjoyment, presence, controller responsiveness, and arousal). Below we articulate the theoretical mechanisms explaining the effects of power poses.

1. The effects of power poses on perception and behavior

Power is expressed through distinctive nonverbal behaviors. People use open and expansive postures, such as spreading limbs and widening the use of personal space to display power, whereas tight and closed postures, collapsing the body inward, and reducing personal space convey low power (Carney, Hall, & LeBeau, 2005; Darwin, 1872). Though there is agreement that power affects the expression of expansive or constricted nonverbal behaviors, recent research has turned the question around by examining whether power poses generate power-related perceptions and behaviors. Participants randomly assigned to display powerful poses show higher testosterone, lower cortisol, increased feelings of power, and greater risk tolerance compared with those displaying powerless poses (Carney et al., 2010). Other studies replicate the effect of power poses on self-reported feelings of power but find no hormonal or risk tolerance effects (Ranehill et al., 2015).

Several mechanisms may account for the effect of physical gestures on psychological processes. Some theorists assume that cognitive and emotional processes are related to the effect, and assume that a self-perception mechanism explains the psychological effects of physical gestures (Strack et al., 1988). People enacting powerful or powerless poses infer or feel that they are more or less in charge of the situation. Another assumption is that self-perception is not necessary and simply hypothesize that physical gestures directly activate perceptual, emotional, and behavioral reactions without people being aware of their expression (Strack et al., 1988).

Isbister et al. (2012) apply the effect of power poses in the design of an experimental video game that examines how physical movement affects user experience and math anxiety. The game *Scoop!* is controlled using natural movements tracked by motion-sensing Kinect cameras. In the “high power” mode, players interact with numbers onscreen while standing and using expansive hand and arm movements, whereas in the “low power” mode players hunch down while sitting at a low table and use a track pad (Isbister et al., 2012).

Though Isbister et al. (2012) study pioneers the use of power poses in video game design, they report on a design project and do not present empirical data of how power poses affect *Scoop!* players. Thus, we examine whether power poses affect basic game experiences including enjoyment, presence, and perceived controller responsiveness. *Enjoyment* is defined as a pleasant response to playing video games that has physiological, cognitive, and affective factors (Vorderer, Klimmt, & Ritterfeld, 2004). In this study, we regard *presence* as the subjective experience of being in a virtual place or environment, even when one is physically situated in a different environment (Persky & Blascovich, 2008). *Controller responsiveness* refers to the ease of use of a game interface and to the speed and accuracy of a game system's reactions to player input (Weber, Behr, & DeMartino, 2014). We expect power poses to affect people's game experience with motion-controlled video games because physical poses inform the brain which specific action the person is about to undertake, thus resulting in increased preparation for adaptive action (Carney et al., 2010; Cesario & McDonald, 2013). Players enacting power poses while holding motion controllers are likely to be more prepared for playing the game relative to those enacting powerless poses. Of key importance, people in power are also more sensitive to their own subjective experiences, show increased goal-orientation, and are more immune to goal-irrelevant information whereas powerless individuals are more focused on external and situational information (Galinsky, Magee, Gruenfeld, Whitson, & Liljenquist, 2008). By definition, game enjoyment, presence, and perceived controller responsiveness are all subjective experiences. Thus, players keeping a power pose should report increases in all of these subjective factors as they will be more focused on their internal states compared with players keeping powerless poses.

H1. *When playing a motion-controlled video game, participants enacting a powerful pose will experience (a) increased enjoyment, (b) presence, and (c) controller responsiveness compared with those enacting a powerless pose.*

1.1. Mediation effects of power feelings

The effect of power poses on perception and behavior operates through self-perception, direct activation, and biological mechanisms. Physical poses may either cause individuals to feel more powerful or powerless, which in turn affects perceptions and behaviors, or physical poses may directly activate perceptual and behavioral patterns with no involvement of cognitive or emotional processes (Stepper & Strack, 1993; Strack et al., 1988). Additionally, powerful poses may decrease cortisol levels, a hormone related to stress (Carney et al., 2010). Ranehill and associates (2015) fail to replicate the effect of power poses on cortisol levels, though they confirm that power poses increase power feelings. Considering this, power feelings may mediate or indirectly influence the effect of power poses on enjoyment, presence, and controller responsiveness, but it is also possible that power poses directly influence