This discussion of the cognitive and motivational components of helplessness and depression suggests new directions for future research in this area. If such research is to increase our understanding of helplessness and depression, it is important that it be guided by theory rather than by practical considerations. Only when the basic propositions of the learned helplessness theory have been fully tested, will we know where to search for the most appropriate applications.

## REFERENCE NOTES

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Reading #10

# 4

# Why Having Control Reduces Stress: If I Can Stop the Roller Coaster, I Don't Want to Get Off[1]

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## INTRODUCTION

Someone in the neighborhood is throwing a big, noisy party. Neighbor A is told to complain if he can no longer tolerate the music and frivolity, although he refrains from doing so (because of self-imposed restraint, etc.). Neighbor B receives no such communication. The party festivities are equally disruptive to both neighbors. Despite this, it is likely that neighbor A (who believes he can complain but never does) will be less disturbed by the festivities than will neighbor B (who will probably spend the whole night stewing and might eventually tip off the police as a "concerned citizen").

Individuals are continually faced with the prospect of aversive events such as the situation just depicted. How can we account for the fact that having control seems to reduce the stress generated by an aversive event? The resolution to this problem is not immediately evident, and no viable theoretical account of it currently exists. Why should control be stress-reducing, even when *(a)* the individual without control has equal predict-

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ability; and *(b)* the individual with control does not actually execute the controlling response?

This chapter attempts to make sense of these issues by presenting two new hypotheses, the "internality hypothesis" and the "minimax hypothesis," to account for the evidence on controllability and human stress. The discussion begins by clarifying the ways in which "controllability" and "stress" have been used in the literature. Next, the major existing theories of controllability are briefly reviewed. Following this, the two new "expected outcome" hypotheses of controllability and their predictions are examined in some detail. Then the experimental evidence is presented and contrasted with the "expected outcome" hypotheses. Finally, the conditions under which individuals prefer not to have controllability but yield it instead to another person are discussed.

## DEFINITIONS OF CONTROLLABILITY

### Actual Control

*Instrumental Control*

The first type of controllability refers to an instrumental training space (e.g., Seligman, 1975) in which the individual is able to make a response that actually modifies the aversive event. Such a response can be either active or passive and can escape (Corah & Boffa, 1970; Gatchel & Proctor, 1976), avoid (Averill & Rosenn, 1972), or otherwise mitigate, the impact of the stimulus (Staub, Tursky, & Schwartz, 1971). The individual without control receives exactly the same physical event that the individual with control has received, but he or she has no response at hand for modifying the event. For example, in a study by Szpiler and Epstein (1976), all subjects were told that they might receive shock following countdown. The two relevant groups consisted of a group that could avoid shock by tapping rapidly during the countdown and a yoked group that tapped rapidly but believed that shock would be random.

A variant of instrumental control is the perceived instrumental control paradigm. Here, the contingencies are arranged such that the individual *believes* that control rests with him or her. However, it is the experimenter who is actually controlling the aversive event. Although this is a psychologically trivial variant of instrumental control, methodologically it is not trivial: It allows individuals in both controllable and uncontrollable conditions to experience exactly the same aversive event, supposedly without the disadvantages of the yoked control design (Church, 1964; Levis, 1976). This point will be elaborated later.



*Self-Administration*

In the second type of controllability, the individual is allowed to deliver the aversive event to himself or herself (Ball & Vogler, 1971; Haggard, 1943; Pervin, 1963). As with perceived (but nonveridical) instrumental control, the self-administering individual cannot change the objective aspects of the situation in any way. Thus, both the self-administering and the experimenter-administering individual receive exactly the same physical stimulus.

A salient methodological confound pervades the entire instrumental control and self-administration literatures. This is due to the fact that both procedures confound controllability—the variable of interest—with predictability. The difference here is that controllability means you can actually *do* something about the event in question, whereas predictability means that you can merely *know* something about the event, whether or not you can do anything about it (cf. Miller & Grant, Note 1). In the case of instrumental control and self-administration, the group with control has both more controllability *and* more predictability than the group without control, because timing is inevitably better for the controlling group. For example, in the instrumental control paradigm, when you escape a shock, you not only control it, but you know exactly when it will go off. In contrast, if you cannot escape a shock, you neither control it, nor do you know when it will go off. Similarly, if you avoid a shock, you both control it and know it will not occur. In the self-administration paradigm, when you deliver a shock to yourself, you not only control it, but you know exactly when it is coming. On the other hand, if it is delivered to you, you neither control it nor do you know exactly when it is coming.

Miller and Grant (1979; Note 1) have extensively reviewed the predictability literature, concluding that there are conditions under which predictable aversive events are "less stressful" than unpredictable events. In the present case, having control makes the aversive event more predictable. For instrumental control, the group with the controlling response perceives more control, as well as more predictability, than the yoked group: Feedback from (and the intention to make) a controlling response also predicts the offset of the aversive event in the case of escape, or the nonoccurrence of the aversive event in the case of avoidance. In the case of self-administration, control is also confounded with predictability because feedback from (and the intention to make) the controlling response also predicts the onset of the aversive event. The perceived (but nonveridical) instrumental control paradigm minimizes differences in predictability while varying perceived control, because the stressor actually occurs independently of responding. The subjects may believe, however, that they have more predictability from feedback just as they believe they have more control. So although actual control is unconfounded

by actual predictability, perceived predictability may still be confounded with perceived controllability. Therefore, in all these procedures, any differences in stress that emerge between groups could be attributed as easily to differences in predictability as to differences in controllability.

It should be noted that the major common virtue of these procedures is that both a group with and a group without a controlling response receive exactly the same physical stimulation. This is done to insure that the groups differ only in psychological factors. The major common flaw of the procedures is that the controlling and the no controlling groups differ on more than one major psychological dimension. As previously noted, the controlling group has more predictability and more controllability than the no controlling group. Therefore, results obtained with these procedures cannot discriminate between the class of theory that says controllability reduces stress *because* it provides the individual with extra predictability and the class of theory that says controllability has stress-reducing effects *above and beyond* providing extra predictability. Because of this confounding, these two categories will not be elaborated any further in this chapter (see Miller, 1979, for a review of the evidence on instrumental control and self-administration).

### Actual Control Equated for Predictability

It should be clear from the foregoing discussion that predictability must somehow be equated for subjects with and without control. Predictability and controllability *can* be kept methodologically distinct by providing the no controlling individual with an external time cue. Such a cue can be used to signal explicitly when the event will arrive in the case of self-administration, terminate in the case of instrumental escape, and occur or not occur in the case of instrumental avoidance. This effectively eliminates differences in timing between the two groups; procedures that provide such signals will be referred to as "actual control equated for predictability" procedures.

### Potential Control

"Potential control" induces individuals to believe that some controlling response is available to them but they refrain from using it. In these studies, the aversive stimulation occurs on a prearranged schedule for all individuals. However, individuals with control have at hand a panic button for terminating the event, which they never actually use. This is important for theoretical reasons, because it teases apart present control and future control. Since individuals refrain from responding, they do not exercise control in the present; rather, they expect that, if need be, they will be able to execute control at some point in the future.

Thus the experimenter is faced with a procedural dilemma: How can he or she both instill a sense of potential control in an individual and at the same time insure that the response will not be acted upon? In the standard procedure, social pressure is brought to bear on individuals so that they refrain from pressing the button (e.g., Glass & Singer, 1972). Alternatively, individuals can be provided with a potential control response for terminating an aversive event that is never subsequently administered. For example, individuals can be threatened with the possibility of receiving preprogrammed electric shocks and then offered a button which they can use to turn off a given shock if necessary. No shock is ever administered; so no individual ever has to press (Miller, Grant, & Nelson, Note 2).



The potential control and equated predictability procedures are both very elegant. In both procedures, an individual with and an individual without control are exposed to the identical physical event, and this event is equally preditable for the two individuals. However, in the case of actual control equated for predictability, amount of actual responding is a minor confounding variable (as it is in instrumental control and self-administration), because the group with control responds more than the yoked group. The potential control case is by far the most elegant. Here the group with and the group without potential control do not differ in degree of actual responding. In fact, they are identical on every dimension except one: The potential control individual anticipates more future control (and predictability) than the individual without such control.

## OPERATIONALIZATION OF "STRESS"

There are three main ways in which "stress" reactions have been operationalized in controllability experiments. The first is to give individuals a choice between a controllable and an uncontrollable aversive event. Or, individuals can be exposed to both controllability and uncontrollability, and then express their preference between them. The second measure is anticipatory arousal, that is, whether or not individuals are more anxious and aroused while waiting for a controllable as opposed to an uncontrollable event. Anticipatory arousal can be assessed either physiologically, via electrodermal and cardiovascular measures, or subjectively, via self-ratings of anxiety and tension. Finally, the third measure is impact arousal, that is, whether or not a controllable aversive event actually hurts less. Impact arousal can be assessed physiologically, subjectively, and behaviorally.

## PREDICTABILITY HYPOTHESES OF CONTROL

There are three major hypotheses which claim that the effects of controllability are reducible to the effects of predictability. This class of hypothesis includes Seligman's (1968) safety signal view, Weiss's (1971) relevant

feedback theory, and Berlyne's (1960) information-seeking view as applied to control. These hypotheses and their fit to the predictability (Miller & Grant, 1979, Note 1) and controllability (Miller, 1979) literatures have recently been reviewed at length. Hence, I will only briefly present and review them here.

The predictability hypotheses all assert that controllability is preferred and less arousing because it provides the individual with additional predictability and proceed to explain why predictability reduces stress. However, they differ on the proposed mechanism by which predictability achieves its stress-reducing effects. Seligman's safety signal hypothesis holds that when a signal (CS) reliably predicts danger, the absence of the signal ($\overline{CS}$) reliably predicts safety and relaxation. In contrast, if no signal reliably predicts danger, then no signal reliably predicts safety. Therefore, the individual never knows when he or she can relax. The crucial mechanism affecting choice of control is differential predictability, and hence differential relaxation, in anticipation of an aversive event. As noted, an individual with either instrumental control or self-administration has more predictability and safety signals than an individual without such control. During a controllable aversive event, the individual can relax more because he or she has more safety signals that the shock will not occur (avoidance), that it will go off (escape), and that it will not come on (self-administration). During uncontrollable shock, the individual has fewer safety signals and so relaxes less. Therefore, control should be preferred because it provides more safety and hence less anticipatory arousal than no control. Safety signal makes no predictions about the effects of control on impact arousal. Weiss's (1971) relevant feedback view is logically similar to the safety signal hypothesis and need not be elaborated here (see Miller, 1979).

Finally, the information-seeking theory of Berlyne (1960) is primarily about predictability, although it can be extended to controllability (see also Sokolov, 1963). The theory says that individuals seek information, and, when faced with uncertainty (unpredictability), they strive for certainty. Moreover, uncertainty causes conflict and also increases surprise and arousal. As control provides more predictability, information-seeking theory predicts *(a)* choice of instrumental control and self-administration, because individuals seek information; *(b)* less anticipatory arousal with such control, because individuals are in less conflict; (c) less impact with control, because individuals are less surprised by the aversive event.

Both the safety signal and information-seeking views fare equally well in accounting for the evidence on instrumental control and self-administration, where having control really does provide the individual with extra predictability. In both categories, the data show choice of control over no control, as well as less anticipatory arousal with control. These results are accurately



predicted by each of the two hypotheses. With regard to impact arousal, controllability appears to reduce aversiveness in the case of instrumental control, but to have no effect in the case of self-administration. The first result is consistent with safety signal and inconsistent with information-seeking, whereas the second result is consistent with information-seeking and inconsistent with safety signal (see Miller, 1979, for a thorough review of this literature).

The predictability hypotheses have in common the view that controllability adds nothing above and beyond more finely tuned predictability. Moreover, they are all present-oriented: Both controlling and no controlling individuals anticipate exactly the same aversive event. The individuals with control have an advantage in the here-and-now, however, because controllability decreases their anticipatory arousal (and/or impact arousal) by reducing conflict or signalling safety. It is for these reasons that such theorizing is inadequate to account for the stress-reducing effects associated with the equated predictability and potential control paradigms. With respect to the equated predictability paradigm, both the individuals with and the individuals without control have equal predictability, because of the provision of external signals to the no controlling individuals. This means that the controlling response neither reduces surprise (information-seeking) nor signals safety (safety signal). Similarly, with respect to the potential control paradigm, both controlling and no controlling individuals are in the presence of exactly the same external signals. They differ only in that the controlling individuals have a manipulandum which they refrain from using. Since the controlling individuals never execute the response, they have no more control and receive no more safety signals or certainty than the no controlling individuals. Therefore, the predictability theories would suggest that there are no stress-reducing effects of having actual control equated for predictability or of having unexercised potential control. Yet, as we shall see, such stress-reducing effects do emerge, and I now propose an alternative class of theorizing that predicts these effects.

## EXPECTED OUTCOME HYPOTHESES OF CONTROL

### The Internality Hypothesis

The internality hypothesis is based on the yoked control argument of Church (1964), which appeared over 15 years ago. It was originally intended as a methodological criticism of the yoked control paradigm, but it can be translated into a general statement of why individuals want control. The hypothesis to be proposed can be distilled as follows: Individuals choose

control because having control improves an aversive outcome. It does so by enabling individuals to present stimuli to themselves to suit fluctuations in their moods, thereby rendering the outcome less painful.

In the yoked control paradigm, the individual without control is presented with exactly the same physical stimuli as the individual with control has received. This is done to insure that the effects of control are not contaminated by differences in the nature of physical stimulation administered to the two individuals. The amount of shock that an individual with control receives is determined by how well he or she executes the controlling response. In contrast, the amount of shock that an individual without control receives is determined by how much shock the controlling individual has received. In the case of instrumental escape, for example, if the controlling individual performs the response within .2 seconds on a given trial, he or she receives only a .2-second shock. He or she is then matched with a no controlling individual, who is similarly administered only a .2-second shock on that trial. In this way, both individuals receive exactly the same sequence of "objective" events, the only difference being that one individual actually goes through the act of making a response.

Church (1964) accepts the fact that the stimuli are *physically* identical as administered by the experimenter (i.e., a .2-second shock in either case). However, he challenges the premise that they are necessarily *experienced* as identical by the two individuals. His view rests on the assumption that individuals typically undergo moment-to-moment fluctuations in their internal states, both physiological and psychological (e.g., mood). So, for example, a physically aversive stimulus such as shock will feel differently, depending on the individual's internal physical state *at the moment* shock is delivered. A given level of shock is going to feel intolerable anytime the individual is in a highly vulnerable internal physical state. However, the exact same level of shock is going to feel less painful anytime the individual is in a less vulnerable state.

Consider now the case of individuals who have learned that they can turn off shock by executing a controlling response. Shock is occasionally going to be turned on at a moment when they are in a highly vulnerable internal state. This will have the net result of making the shock feel particularly painful, and hence the individuals will be motivated to turn off the shock as quickly as possible (e.g., in less than .2 seconds). Conversely, anytime the shock is turned on at a moment when they are in a less vulnerable internal state, they will be slower to turn off shock (e.g., in greater than .2 seconds). This means that *although the individuals with control sometimes receive "subjectively" tolerable shocks of long duration, they never receive a "subjectively" intolerable shock of long duration.*

*The yoked control individuals* are in a very different situation, however. Because shock is being turned on and off without regard to fluctuations in their internal states, they are *bound to receive, at some point, a "subjectively" intolerable shock of long duration.* Therefore the two groups of individuals are actually receiving different psychological outcomes, and Church argues that this artifact pervades the entire animal literature.



The internality view thus predicts stress-reducing effects of the standard instrumental control and self-administration procedures, because the individual with control can match his or her internal state with external events. This means that *(a)* control should be chosen over no control; *(b)* control should be associated with less anticipatory arousal, because the individual is waiting for a less intense aversive event; and *(c)* control should be associated with less impact arousal, because the aversive event actually hurts less. The experimental evidence generally supports these predictions. The real value of the hypothesis, however, is the fact that control changes the expected outcome. This means that all these results should still occur, even when the individual without control is provided with equal predictability. This is because the provision of external signals does not enable the individual without control to more accurately match his internal state with external events, and so he or she cannot improve the outcome. Therefore, control should still be chosen and should lead to decreased anticipatory and impact arousal.

The internality hypothesis also predicts reduced stress as a result of potential control. Recall that the potential control individuals are given a panic button which they can use to terminate the aversive event. Therefore they *anticipate* that they will never receive a long-duration intolerable shock. If the shock should be turned on when they are in a highly vulnerable internal state, they know that they can always turn it off quickly. Although mild and even moderate "subjectively" aversive events are being turned on and off without regard to their internal states in the here-and-now, the individuals with potential control still have an advantage over the individuals without potential control. This is because they expect to shorten any subjectively *intense* shocks that occur in the future and thereby improve the anticipated outcome. The hypothesis predicts *(a)* choice of potential control over no control; *(b)* less anticipatory arousal with potential control, because the subjects anticipate an overall less aversive US; and *(c)* no effect of unexercised potential control on impact, because the response is never made. Therefore, the aversive event is experienced as subjectively identical by the two groups of individuals.

### Minimax Hypothesis

Minimax hypothesis, like the internality view, says that controllability provides the individual with more than just extra predictability. Both views are, in addition, oriented toward expected outcomes; that is, an individual with control expects a less aversive *outcome* than an individual without

control. According to the internality view, the mechanism by which controllability achieves this effect is by enabling an individual to match his or her internal state with external events. According to minimax, the mechanism by which controllability achieves this effect is by providing a guaranteed upper limit on how bad the situation can become. Minimax hypothesis proposes that, in aversive situations, individuals want to minimize the maximum danger to themselves; that is, they are inclined to "make the best of a bad situation," and controllability enables them to do so. The theory is explicitly stated as follows: "A person who has control over an aversive event insures having a lower maximum danger than a person without control. This is because a person with control attributes the cause of relief to a stable internal source—his own response—whereas a person without control attributes relief to a less stable, more external source [Miller, 1979]."

Consider what happens when two groups of individuals are threatened with the same high-intensity electric shock. Those with instrumental control know that all they have to do is execute the controlling response, and shock will termiante fast; that is, they have a guarantee that the maximum upper limit of duration of shock will not be greater than their reaction time. They are also assured that any future such shock will only occur up to some relatively low, maximum amount. In contrast, the individuals who do not have instrumental control have no guarantee that a high-intensity shock will go off quickly. For example, in the laboratory, individuals with control are typically told that they can and should turn off shock in the minimum time required. In contrast, individuals without control are simply told that shock will eventually be turned off. This means that the controlling individuals know that they can *always* obtain relief from a high-intensity shock. The no controlling individuals, however, can *never* know for certain whether or not they will obtain immediate relief.

So the minimax hypothesis predicts that individuals choose instrumental control over no control, because instrumental control minimizes the maximum duration, intensity, and/or frequency of the aversive event. Minimax hypothesis predicts less arousal in anticipation of an instrumentally controlled event. Anticipatory arousal is proportional to the magnitude of the anticipated danger, and the anticipated upper limit of the event is lower with control. Thus, an individual who is waiting for a 7 MA shock that will not exceed 1 second in duration will be less aroused than will a subject who is waiting for the same 7 MA shock that might last as long as 10 seconds. The theory makes no explicit prediction about impact, as it postulates no mechanism by which expectations about the upper limit of an impending shock affect how painful the shock will actually feel.

Identical logic applies to the case of self-administration, where the experimenter-administered procedures also give an individual fewer guarantees than the self-administering procedures. Individuals who can self-administer shock to themselves know that once they have had enough, they can simply not deliver any more shock. They also know that they will not self-administer six shocks if they are only scheduled to receive five. Nor will they give themselves a 2-second shock instead of the scheduled 1-second shock. In contrast, an individual whose fate is in the hands of the experimenter has none of the above guarantees. So, as with instrumental control, minimax hypothesis predicts preference for self-administered shock and less anticipatory arousal. Again, the hypothesis makes no explicit prediction about impact. Similar to the predictability views and internality hypothesis, minimax adequately handles the data on instrumental control and self-administration (see Miller, 1979).



Note that minimax differs from the internality view in explaining the effects of instrumental control and self-administration. Internality specifically relies on an individual matching his or her internal state with external events in order to improve the anticipated outcome. Minimax, on the other hand, postulates that controllability provides an individual with a guaranteed upper limit on how bad the situation can become. Such a guarantee effectively improves the expected outcome and reduces stress, independently of whether or not individuals even undergo variations in their internal states. For example, when an individual is threatened with a high-intensity shock that he can turn off himself in 1 second (controllability), he anticipates a more guaranteed outcome and shows less stress than a subject who must rely on the experimenter to turn it off in 1 second (uncontrollability). This effect occurs even though the same shock is scheduled to be turned on at a subjectively invulnerable (or vulnerable) moment for both individuals, because it is the guaranteed maximum aversiveness and not the variations in internal state that is crucial for minimax.

There is an important attributional premise which is implicit in minimax hypothesis and which should be explicitly stated. This premise accounts for the stress-reducing effects of the equated predictability and potential control procedures and also helps to clarify how minimax differs from the internality view. Minimax proposes that when individuals have control, they go on to attribute this control to an internal, stable factor: their own responding (Weiner, Frieze, Kukla, Reed, Rest, & Rosenblum, 1971); that is, when danger is controllable, the individual attributes its effects to him or herself. When danger is uncontrollable, the individual must make alternate, external attributions that are more unstable [e.g., the experimenter is controlling, luck, benevolent (or malevolent) God, bureaucracy, and the like]. This difference is crucial to the hypothesis, because "If a subject attributes the cause of relief to a stable, internal factor—such as his own response—he has a reliable predictor that in the future, danger will only occur up to some relatively low, maximum amount. In contrast, if the attribution is to some unstable, external factor—such as the experimenter's whims—future danger is not

guaranteed to be restricted to any relatively low maximum [Miller, 1979]." Consider an individual who can turn off shock for himself. He can depend on his own actions, and so he can predict that shock will be turned off in the minimum time it takes for him to perform his controlling response. This individual will show reduced arousal. Consider now an individual who must rely on the experimenter. Even though the experimenter's actions may have been reliable and predictable in the past, the individual cannot count on them for the future as reliably as he can on his own response. It is always possible that the experimenter will fall asleep or forget in the future, or become sadistic, no matter how efficient his performance has been thus far. This individual will show sustained arousal, because an unfamiliar experimenter is relatively less stable than his own response.

Thus, controllability and uncontrollability result in opposing attributions for the cause of relief: The former is to an internal, stable factor, whereas the latter is to an external, unstable factor. According to minimax, it is the difference in the stability dimension, not the internality dimension, that is crucial in accounting for the stress-reducing effects of control: That is, whatever guarantees the maximum danger must not be capricious or, in other words, it must be stable. So there is no inherent value to having control per se. Rather, intenral factors (such as one's own response) generally tend to be more stable than external factors.

Therefore, minimax predicts that controllability will be preferred and produce less anticipatory arousal even when the no controlling group is equated for predictability. Although external signals may have given equal predictability of onset and offset of shock in the past, they are a less stable guarantee of future minimized danger than is an individual's own response.

Potential (but unexercised) control should also be preferred to no control, and potential control should reduce anticipatory arousal. Subjects with a panic button believe that the maximum duration and intensity of shock on each trial is limited to the latency of their reaction time to press the button. They will be less aroused than their counterparts without a panic button, who have no guaranteed maximum on each trial and so anticipate a worse outcome. Minimax is silent about whether or not impact is reduced by potential control or by actual control equated for predictability.

The internality hypothesis differs from minimax in stressing the internality, and not the stability, of controlling responses. According to this view, there is an inherent value to control per se, because it enables the individual to most optimally match his or her internal state with external events. This is crucial, because such matching is the means by which an individual is able to improve an aversive outcome. The fact that an internal controlling response is also more stable than an external factor is unimportant.

Bandura (1977a, 1977b) has proposed a self-efficacy theory of the effects of control which is compatible with minimax. The theory states that



personal control endows individuals with a high sense of self-efficacy, or perceived ability, for coping with an aversive event. When individuals expect to minimize an event (by avoidance, escape, etc.), they have little reason to fear it. This means that they do not engage in repetitive perturbing ideation which, in turn, reduces their level of anxiety and arousal. In contrast, individuals who judge themselves inefficacious expect a more aversive event, which generates more stress-inducing thoughts. This, in turn, maintains a high level of anxiety and arousal.

The self-efficacy view thus places greater explicit emphasis on negative self-referent cognitions as the mediator of anticipatory arousal than minimax does. Minimax holds that arousal is proportional to the magnitude of the anticipated danger. When an individual has control, the anticipated danger is minimized, and so arousal is reduced. In essence, having control is equivalent to transforming an expected two-shock into an expected one-shock situation. However, minimax would also accept the social learning premise that the greater the danger one anticipates, the more likely one is to think about and magnify the potential perils to oneself. This can mean that the aversiveness of the subjectively anticipated event far exceeds the objective aversiveness of the event, thereby increasing anxiety and arousal beyond the actual danger. An individual who lacks some form of behavioral control is in an objectively more dangerous situation than is a subject with control. This may, in turn, activate a chain of disturbing cognitions which subjectively magnifies the anticipated event and so contributes to maintaining elevated levels of anxiety and arousal.

Social learning theory also proposes a mechanism for reduced impact. The theory assumes that self-referent negative cognitions not only precede but also accompany the onset of aversive events, particularly with prolonged rather than punctate events (e.g., "What if the shock should start to get even worse"). Such cognitions generate anticipatory arousal, which overlays impact arousal. Although controllability may not actually make the event hurt less, it eliminates negative cognitions and therefore reduces the anticipatory arousal overlay. This, in turn, reduces the net impact arousal. The anticipatory arousal premise can be appended to either the minimax or internality hypothesis to account for impact differences between controllable and uncontrollable groups.

## EVIDENCE

### Actual Control Equated for Predictability

There are three instrumental control studies and one self-administration study that hold predictability constant between a controllable and an uncontrollable group. All four studies still find significant stress-reducing effects as

a consequence of exercising control. For example, in a study by Geer and Maisel (1972), two groups were shown slides of dead bodies, which were always preceded by a 10-second tone. Individuals who had control were told to turn the slides off when they became too aversive. Individuals without control could not escape but were told how long the slides would be on. Therefore, both groups equally could predict slide onset and offset. Electrodermal arousal was measured throughout, and the results showed less anticipatory and impact arousal for the group that could escape. Moreover, the group that could predict but not control aversive stimulation actually showed more anticipatory arousal than a third group, which could neither predict nor control the slides. Thus, if anything, predictability enhanced stress reactions under conditions where controllability decreased such reactions.

Minimax can account for the Geer and Maisel (1972) results because having a control response provides a more stable guarantee of a maximum upper limit of danger ("This slide in front of me, and any future slide, cannot last longer than my reaction time to turn it off"). The internality view, on the other hand, would say that having a control response allows the individual to match his or her internal state with external events ("Right now I feel particularly squeamish, and so I will press the button fast"). Thus both expected outcome hypotheses can easily and equally handle these data.

In a second instrumental control study by Geer, Davison, and Gatchel (1970), individuals were occasionally shocked while performing a reaction time task. One group of subjects (controllability) was then told they could reduce shock from 6 seconds to 3 seconds if they responded fast enough. The other group (uncontrollability) was simply told that all shocks would now last 3 seconds. As with the Geer and Maisel (1972) study, individuals who could control showed less electrodermal arousal, both anticipatory and impact, than individuals who could not control. In addition, the results of a replication study by Glass, Singer, Leonard, Krantz, Cohen, & Cummings (1973) showed that the controlling group also rated the shock as less painful and performed better on a behavioral posttest than the no controlling group, although there were no electrodermal differences between the groups.

Minimax hypothesis would explain the above data by saying that an individual who attributes the cause of shock duration to his or her own response has a more reliable guarantee than the no controlling individual that all present and future shocks will never exceed 3 seconds. The internality view, on the other hand, at first blush appears to have greater difficulty explaining these data. Both an individual with control and an individual without control are receiving exactly the same improved outcome—a shorter duration shock. Moreover, for both individuals, shock is actually occurring without regard to momentary internal fluctuations. All shocks, whether turned on at a subjectively tolerable or intolerable moment, are uniformly 3 seconds for all individuals. Therefore, the controlling individual has no more opportunity to somehow diminish the impact of a subjectively intolerable shock than the no controlling individual, because the latter never receives a long-duration (6-second) intolerable shock. Controlling individuals may *expect*, however, that they will have more opportunity to match internal states with external events and thereby improve the outcome, just as they expect to have more control. Since no shock ever actually exceeds 3 seconds, this expectation is never contradicted. No controlling individuals do not expect to match their internal states with external events, and so they expect a worse outcome. It is these differential expectations, then, that account for the stress-reducing effects of control. Indeed, when a group is told it can reduce shock, but the reduction does not occur (shock still lasts 6 seconds), arousal remains high (Glass et al., 1973). Thus, induced beliefs about control only reduce stress if these beliefs are not contradicted by environmental events. As Bandura (1977a and 1977b) has noted, since individuals cannot actually improve the aversive event in laboratory studies using the "perceived" control paradigm, such studies may underestimate the beneficial effects that accrue to having control in the real world.



Finally, there is one self-administration study where predictability and controllability are not confounded (Björkstrand, 1973). Here a light CS signaled shock onset for both groups, but one group could self-administer shock when the light came on, and the other group could not. The self-administration group showed reduced electrodermal skin conductance response to shock, but not to the signal. The minimax hypothesis must invoke an additional premise to explain these results, such as the social learning theory premise that having a controlling response reduces the anticipatory arousal component of the impact response. The internality hypothesis must also invoke a similar premise, since the controlling individual cannot choose a subjectively "invulnerable" moment to deliver shock to him or herself. Therefore shock per se should not actually "hurt" less.

### Potential Control

Only one study has measured choice of potential control (Miller et al., Note 2). Here individuals were threatened with low probability shocks that would go on and off on a prearranged schedule and were then told: "There are two groups of subjects in this experiment, and it's up to you which group you want to be in. . . . Should you decide to be in group one, I will put a button beside you that can affect the shocks. . . . On any given trial, if a shock occurs, you can stop it if need be by pressing the button. It would be up to you whether or not you ever used the button. Should you decide to be in group two, you would not have this button available to you. . . . Which group

would you like to be in?" No individual was ever actually administered a shock, and so no individual ever exercised the response. Of the 32 individuals, 25 chose potential control. The majority of individuals who chose control said they did so in order to potentially limit the amount of shock they might receive. Those who chose no control said they did not think shock would ever get very bad and having the button would only focus their mind on shock.

Interestingly, choice of the button could be predicted by how stressed individuals were by the initial threat of receiving electric shock—before they knew about choice of button or no button. Individuals who were subjectively aroused by the prospect of shock subsequently opted for the button when it was offered, whereas individuals who were only minimally aroused by shock subsequently opted not to have the button. Moreover, having control reduced self-rated arousal, because over the course of the experiment individuals who chose the button decreased in anxiety to the low level of the no button group. So individuals choose potential control when aroused by upcoming aversive events, and the knowledge of such control promotes anticipatory relaxation.

Because individuals selected for themselves whether or not they would have the button, it is possible that the subsequent reduction in stress reflected simple habituation over trials rather than the presence of the button per se. In a follow-up experiment, each individual was exposed to both button and no button trials, randomized for order. Individuals who were initially made highly anxious by the prospect of electric shock subsequently reported less arousal during button than during no button trials, whereas this effect was not obtained for individuals who were not made as anxious by the prospect of shock. In fact, individuals who were the least aroused by the threat of electric shock subsequently reported more, *not* less, arousal during button than during no button trials. Typical comments of these subjects were to the effect that the option of exercising control only made them think more about shock. As with the first experiment, individuals who were benefited by control said they felt more secure with the button because they could limit shock if the need arose.

To summarize, there are three major findings from the two experiments just reported: *(a)* The majority of individuals prefer to have potential control; *(b)* they do so in order to potentially improve an aversive outcome; and *(c)* they show reduced anticipatory arousal when such control is available. These findings are consistent both with minimax and with the internality view, the former because potential control provides a guaranteed upper limit on the duration of any given shock and the latter because a subject can shorten the duration of a subjectively intolerable shock. There are two further findings worth highlighting: *(a)* A minority of individuals prefer not to have potential control; and *(b)* such individuals express more anticipatory



anxiety when they have a button available than when they do not have a button available. This suggests that, under some circumstances, there is an emotional cost associated with potential control. A low-anxiety individual who does not have a panic button may find it easy to psychologically remove himself from the threat of electric shock and thereby relax. When such a button is provided, it may remind him of the threat and undermine his ability to psychologically withdraw himself from shock-related thoughts. These considerations bear on the issue of when and under what circumstances individuals choose to relinquish control to another person and will be elaborated later.

One study (Glass, Reim, & Singer, 1971) obtained a physiological measure of anticipatory arousal (electrodermal skin conductance level) and also found reduced arousal with potential control. The impact and post-impact effects of potential (but unexercised) control are more contradictory. None of the studies has found that potential control improves performance on a behavioral task during the aversive event (impact) (Glass, Singer, & Friedman, 1969; Glass et al., 1971; Sherrod & Downs, 1974), and only one out of three studies has found that potential control lowers the physiological response to impact (electrodermal skin conductance responses) (Corah & Boffa, 1970 versus Glass et al., 1969; Glass et al., 1971). In contrast, two out of two studies found reduced pain ratings with potential control (Corah & Boffa, 1970; Glass et al., 1969), and two out of two studies found improved post-impact performance on a behavioral task with potential control (Glass et al., 1969, 1971). These data are too inconsistent to be brought to bear on the hypotheses.

Thus, the internality and minimax views both can account equally well for the evidence on actual control equated for predictability and potential control. Both hypotheses predict preference for control and reduced anticipatory arousal with such control, and the data confirm these predictions. In addition, both hypotheses need a supplementary premise, such as reduced overlay of anticipatory arousal, to explain the possibility of reduced impact and post-impact arousal with such control.

There is a final piece of evidence which seems to discriminate between the views. Bowers (1968) told one group of individuals that they would be able to avoid shock during the experiment, whereas the other group was told that shock delivery would be random. Before the experiment proper, all individuals underwent a shock–tolerance procedure to set the level of shock that would be used. Both groups were encouraged to take as much shock as possible. For individuals who believed they would be able to avoid shock, the level rated as painful was *twice* the intensity of the shock rated as painful in the no controlling group. So the expectation of control seems to have a direct effect on increasing how much shock will be tolerated.

Minimax can explain these results on the basis that controlling indi-

viduals have a guaranteed upper limit (provided by their own response) on how bad shock can become during the experiment. Therefore, they are less concerned to leave themselves a safety margin than are individuals who have no control. The results are more of a problem for the internality hypothesis, which views individuals as concerned to match their internal states with external events. Under these circumstances, it is hard to understand why an individual would ever consent to a level of shock that may, at a subjectively vulnerable moment, feel intolerable. Even an individual with control, who can conceivably turn off such a shock and thereby shorten its duration, should prefer to forestall the possibility of its occurrence altogether. So he or she should opt for the same level of shock that the no controlling individual has judged to be subjectively tolerable. Thus, there is at least one set of data which supports minimax more than the internality view. In the next section, I review yet another set of findings which discriminates between the two hypotheses.

## RELINQUISHMENT OF CONTROL

One of the main advantages of the minimax view as compared to the internality view is that the former hypothesis makes systematic predictions about when individuals will prefer to have control and when they will prefer, instead, to relinquish control to another individual. This is important, because it is obvious that in real life people often voluntarily yield control. Moreover, in the laboratory, there is always a minority of subjects who prefer to opt for uncontrollable aversive events when offered a choice (e.g., Averill, O'Brien, & DeWitt, 1977; Averill & Rosenn, 1972).

The minimax hypothesis postulates that, in stressful situations, individuals are concerned to put an upper limit on the amount of aversive stimulation they must undergo. Therefore, the hypothesis specifies that individuals should choose control only when they believe that their own responding provides the most stable guarantee of a maximum upper limit of danger. In contrast, they should relinquish control when they believe that some factor other than their own responding provides a more stable guarantee of a maximum upper limit of danger. There are three main circumstances under which internal factors will be construed as less stable than external factors. The first such circumstance is when an individual is uncertain as to whether he or she can reliably execute the response needed to produce the outcome. For example, Bandura (1977a, 1977b) has provided evidence showing that individuals who doubt their own "self-efficacy," that is, their ability to execute a given behavior, tend to avoid threatening situations and to show more stress when forced into such situations than individuals who have high efficacy expectations. The second circumstance which reduces the stability of internal factors is when an individual is uncertain that execution of the response will reliably lead to the outcome. Averill et al. (1977) conducted an experiment in which the probability of avoiding shock by pressing a button was either 1.00, .66, or .33. Preference for control decreased as the probability of shock avoidance decreased from 1.0. Finally, internal factors may be construed as less stable when the individual has to discover the response that reliably leads to the outcome. In two experiments (Gatchel & Proctor, 1976; Gatchel, McKinney, & Koebernick, 1977) controlling individuals were simply told that there was something they could do to avoid aversive noise and were provided with a microswitch. The correct controlling response was actually four presses on the microswitch, and inviduals could only learn this after several trials. Under these conditions, having an instrumental controlling response maintained high anticipatory and impact arousal. This result is in contrast to the majority of instrumental control studies, which provide individuals with an easy controlling response and which show reduced anticipatory and impact arousal as a consequence of such control.



In all of the aforementioned three circumstances, having an internal response does not guarantee stability. Therefore, uncontrollability may be more preferred and less arousing than controllability. The limited evidence cited suggests that this may well be the case. Conversely, external factors may be highly stable. Individuals should trust someone else more than they trust themselves when they believe that the response of this other person is a more stable guarantee of a maximum upper limit. For example, most people would choose having a skilled doctor administer a hypodermic to them rather than administer it to themselves. Under these circumstances, uncontrollability will again be more preferred and less arousing than controllability. This effect should decrease as the judged stability of the external controlling factor decreases. Individuals will be less likely to yield the hypodermic to a nurse than to a doctor, and to feel more stress in the nurse than in the doctor condition.

In contrast to minimax, the internality hypothesis emphasizes the internality, and not the stability, of controlling responses. It says that control is chosen in order to most optimally match one's internal state with external events, thereby improving the aversive outcome. A given individual is obviously a better judge of his or her own moment-to-moment internal fluctuations than is any external factor. This means that individuals should always choose to retain control, because this is the most effective way of optimally matching internal states with external events. When an individual chooses uncontrollability he or she is, in essence, giving up the opportunity and possibility of accomplishing this match. Therefore, even in circumstances where internal factors are not construed to be very stable, individuals should still prefer controllable over uncontrollable aversive events. For example, even an in-

dividual who is slow to turn off shock should prefer to have an escape response, because he can conserve his energy and effort until he is in a highly vulnerable internal state. Then he can marshall all his resources toward shortening a shock that is turned on at that vulnerable moment. Similarly, individuals should decline to yield up control to another individual, although they may believe that this individual has a more stable controlling response than their own. While an individual may have a generally less steady hand for administering hypodermics than a doctor does, he is nonetheless a far more accurate judge of his own internal fluctuations. Therefore he can choose the opportune moment at which to go through with the injection. The doctor does not have access to such finely tuned information and so will tend to deliver the injection at random. This is bound to make the event feel more painful, despite the fact that it is administered by a steady hand. The heart of the internality view, then, is that an aversive outcome is improved by taking account of internal states. Individuals should thus elect to retain control, because this enables them to take account of their own internal states. This, in turn, increases the likelihood of obtaining the improved outcome.

No evidence presently bears on the question of whether individuals will ever actually yield control to another person, and this has been perhaps the most salient empirical gap in the literature. Minimax is unique among the competing hypotheses in predicting that such relinquishment should occur under conditions where internal factors are construed to be less stable than external factors (see also Bandura's [1977a, 1977b] self-efficacy view). The following experiment was conducted to address this issue (Miller, Harkavey, & Hammel, Note 3). In the first part of the study, an individual's belief about how reliably he or she could execute a given response relative to another person was manipulated. In the second part of the study, performance of this response determined how much electric shock both individuals would receive. The individual could elect either to execute the response him or herself, or to allow the other individual to execute it on his or her behalf.

The design of the experiment was as follows: The rationale given to subjects was that the experimenter was interested in determining how the presence of another person affects performance on a task. Therefore, both they and another individual (actually a confederate) would be performing a reaction time task at the same time, and the speed of their performance would then be compared with already established norms. Once they had completed the test, the subject and the confederate each received feedback in the presence of the other individual about their own performance. The results were "rigged" so that subjects fell into one of the three following groups: *(a)* In the "superior ability" condition, the subject performed above, and the confederate below, the average; *(b)* in the "comparable ability" condition, the subject and the confederate each performed about average;



and finally, *(c)* in the "inferior ability" condition, the subject performed below, and the confederate above, the average.

Following this, both individuals were told that they were now in the second phase of the study, which involved their reactions to stress (in the form of electric shock to the fingers). Each individual then went through a procedure (feigned on the confederate's part) to establish their "threshold" or zero point for first sensing electric shock. They were told that the shock to be used during the experiment proper would be adjusted to feel moderately painful to each of them. This was done to instill the belief that both the subject and confederate would be receiving equivalent levels of physical stimulation and so should have equal incentive for avoiding such stimulation. At this point, the confederate was presumably escorted to the room next door to be hooked up to another shock apparatus. Finally, the subject was read the following instructions: "For this part of the experiment, there will be a series of experimental trials. At the end of each trial, you will receive an electric shock. [The other subject] will also go through these trials, and receive a shock at the end of each trial. You two are, in effect, wired together. . . . Now, *one of you will have a way of affecting the shocks* with a set of switches like this. When the white light comes on, you switch all the switches down and up, down the row, in sequence 1–2–3–4–5. If you can do it in 2 seconds, no shock will occur. It if takes longer than 2 seconds, the shock stops as soon as you finish the sequence. The switches turn off the shock for both of you, but only one of you will have the switches. Because you are in the group that stays in this room, you have the choice of who gets the switches. The other subject will not be told that you had a choice. He or she will either be given the switches or not. So, do you want the switches or do you want [the other subject] to have them?"

In sum, the speed of a subject's reaction time to turn off the shock was the crucial factor in determining how much shock would be received. Minimax hypothesis would predict that subjects in the superior ability condition should want to keep the button, because they were shown to have a reaction time faster than that of the confederate. Similarly, subjects in the comparable ability condition should opt for the button, because there should be a bias for opting for control, given no compelling evidence for relinquishing it. Conversely, subjects in the inferior ability condition should want the confederate to have the button, because he or she was shown to have the more stable response.

Before going on to present the results, one possible source of confounding should be noted. The question of interest here was whether individuals could be induced to relinquish control when they judged their own response to be less stable than that of another individual. Therefore it was important to control for the effects of having failed per se. Otherwise it could be argued

that choice of control or no control in the inferior ability condition was primarily due to the increased helplessness or lowered self-esteem that such failure typically induces. To accomplish this, half of the subjects performed an irrelevant "memory" task (instead of the reaction time task) during the first part of the experiment, in which their performance was either superior, comparable, or inferior to that of the confederate. Here subjects in the inferior ability condition would have judged the confederate to be more skilled at memory tasks, but they would have had no basis for determining whether he or she was more skilled at reaction time tasks and hence at avoiding shock. Thus, although subjects in both the memory and reaction time inferior ability conditions would experience failure equally, only subjects in the reaction time inferior ability condition would construe this failure as an indication of their unreliability (relative to the other individual) to limit the amount of shock received.

In sum, relinquishing the button on the shock task is simply due to the effects of failing on a prior task, then subjects in the inferior ability conditions of both the memory and reaction time tasks should yield control equally. If, on the other hand, subjects only relinquish the button when they believe that another individual has a more stable response for minimizing danger than they do, only subjects in the reaction time inferior ability condition should yield control. Subjects in the other two reaction time conditions and in *all three* memory conditions should choose equally to keep the button.

Table 4.1 depicts the number of subjects in the reaction time superior, comparable and inferior ability conditions who opt to keep the button (control) or to yield it (no control). As can be seen, all of the superior ability subjects and the majority of the comparable ability subjects chose control. In contrast, the majority of subjects in the inferior ability condition chose no control. The difference between conditions is highly significant, and this effect has since been replicated in a follow-up study (Miller, Harkavey, & Hammel, Note 4).

The results of the reaction time task suggest that individuals prefer control only to the extent that their own response is the most stable guarantee for minimizing the maximum danger. When an external factor, such as

**TABLE 4.1**
**Number of "Reaction Time" Subjects Who Choose to Retain or Yield Control**

| | Retain control | Yield control |
|---|---|---|
| Superior ability | 8 | 0 |
| Comparable ability | 5 | 3 |
| Inferior ability | 2 | 6 |



another person, has a more stable response, then individuals prefer not to have control. However, the possibility exists that choice of no control is not dictated by stability considerations but rather by the helplessness-inducing effects of failure. What, then, happens when subjects fail on a task that does not reflect on the ability of themselves or an external factor to execute the controlling response? The number of subjects choosing control and no control in the memory task conditions is given in Table 4.2. Unlike the reaction time results, the majority of subjects chose to retain control in all three conditions, including the inferior ability condition. Therefore choice of no control is not an artifact of experience with failure.

It is noteworthy that in the superior ability condition of both the reaction time and memory groups, all subjects chose control. For the comparable ability condition of both tasks, the majority of subjects similarly chose control, and no difference emerged between the two conditions. For the inferior ability condition, however, choice of control or no control was determined by which group an individual was in: The majority of reaction time subjects opted for no control, whereas the majority of memory subjects opted for control. Thus, choice of control or no control is not a consequence of having experienced failure but seems to be dictated by an individual's desire to minimize the maximum danger to himself.

In Bandura's (1977a, 1977b) terms, subjects in the memory conditions and in the superior ability and comparable ability reaction time conditions have a high sense of their own self-efficacy or personal effectiveness for terminating shock. Conversely, subjects in the reaction time inferior ability condition have a low sense of their own self-efficacy for terminating shock and doubt their personal effectiveness. How do such estimates of one's coping ability affect the degree of anxiety and stress experienced by individuals? On the one hand, it could be argued that perceived efficacy should lower stress and anxiety, because having an internal, stable controlling response is one of the most reliable guarantees of an upper limit of danger that an individual can have. On the other hand, personal control often places heavy demands on the individual, in the form of increased responsibility; high investment of time, effort, and resources; as well as the ever-present possibility of failure (cf. Bandura, 1977a, 1977b). According to the social

**TABLE 4.2**
**Number of "Memory Task" Subjects Who Choose to Retain or Yield Control**

| | Retain control | Yield control |
|---|---|---|
| Superior ability | 8 | 0 |
| Comparable ability | 6 | 2 |
| Inferior ability | 6 | 2 |

learning view, such demands generate worry and rumination which, in turn, elevate stress and anxiety. Therefore, it is conceivable that although individuals choose to exercise personal control when it is the most effective means of minimizing aversive situations, they do so at an emotional cost. The greater the demands on the individual, the greater the emotional toll should be. In contrast, when individuals can yield control to another person who is judged to be a highly reliable guarantee of maximum danger, they may show reduced stress and anxiety. Even though the no controlling individuals have a lowered sense of self-efficacy, all of the benefits of personal control nonetheless accrue to them without any of the demands; that is, they anticipate the same less aversive outcome, but do not have to invest any time, effort, or resources in achieving this outcome. Moreover, they do not bear any of the responsibility if the situation should somehow go awry.

Some evidence from the present experiment bears on these considerations. The Multiple Affect Adjective Checklist (Zuckerman, Lubin, & Robins, 1965) was administered at various points during the experiment to assess mood change. It was found that choice of control or no control did affect subjects' ratings of mood on the anxiety subscale. Those subjects who opted to keep the button showed an increase in self-reported anxiety, whereas those who opted to yield the button showed a slight decrease in anxiety. This was true for all subjects, regardless of which task they performed and regardless of whether their performance was superior, comparable, or inferior to that of the confederate. Moreover, perceived ability per se had an effect on mood, with subjects in the superior ability condition showing the greatest increase in anxiety, and subjects in the inferior ability condition showing the least increase in anxiety. A similar effect was observed for ratings of hostility. It is also worth noting that subjects whose perceived performance was inferior to that of the confederate did not differ in depression from subjects whose perceived performance was superior or comparable to that of the confederate.

To summarize, although individuals generally choose to retain control over aversive stimulation, they only do so as long as they believe their own response is the most stable factor for limiting the maximum danger to themselves. When they believe that another individual has a more stable response for minimizing the maximum danger, then they relinquish control to that other person. This relinquishment of control cannot be explained by failure-induced self-esteem loss or by increased depression. Indeed, if anything, it is those individuals with a stable *internal* controlling response who suffer an emotional cost. They maintain higher levels of anxiety and hostility than do individuals who can yield control to a stable, *external* factor. These results are inconsistent with the internality view, which emphasizes the internality aspect of control and so does not specify conditions where individuals should prefer uncontrollability. The data are consistent with th minimax view, which emphasizes the stability aspect of control and s specifies that uncontrollability will be preferred under conditions wher external factors are construed as more stable than internal factors.



## SUMMARY

In conclusion, two expected outcome views have been proposed, whic make sense of the literature on controllability and human stress. Contro lability improves an aversive outcome by providing individuals with a guar anteed upper limit (minimax) or by enabling them to match their interna state with external events (internality). Both views are adequate to explai the stress-reducing effects of actual control equated for predictability an the effects of potential control. However, only minimax specifies condition under which individuals will choose to relinquish rather than retain contro and these predictions are supported by the experimental evidence.

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